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[*Authors alone are responsible for the contents of their respective Papers.*]

SECRETARY'S NOTES.

1. The following officers joined the Institution during the month February:—

Lieutenant H. J. N. Davis, Connaught Rangers.
Major T. C. W. Molony, R.F.A.
Captain F. W. Lumsden, R.M.A.
Lieutenant H. A. Clifton, 7th Dragoon Guards.
Major W. R. J. Ellis, Yorkshire Light Infantry.
Captain H. E. Trevor, Yorkshire Light Infantry.
Captain R. E. Boulton, Yorkshire Light Infantry.
Captain W. D. Wright, **V.C.**, Queen's Royal West Surrey Regiment.
Lieut.-Colonel P. H. Johnston, C.M.G., M.D., R.A.M.C.
Captain M. R. Walsh, Worcestershire Regiment.
Lieutenant S. O. Robinson, 5th Battalion Middlesex Regiment.
Captain S. E. Holland, Rifle Brigade.
Major L. H. Parry, R.G.A.
Captain A. Burrows, Loyal North Lancashire Regiment.
Captain P. H. Climo, R.G.A.
Second Lieutenant R. A. Lloyd-Barrow, 14th Hussars.
Captain R. N. Greathed, R.F.A.
Captain H. G. A. Thomson, Royal Warwickshire Regiment.
Colonel H. Lysons, **V.C.**, A.A.G., India.
Captain E. J. Harbottle, 1st V.B. Devonshire Regiment.
E. D. Evans, Esq., late Lieutenant 1st V.B. K.O. Royal Lancaster Regiment.
Major A. French, late Suffolk Regiment.
Second Lieutenant L. E. Parker, Grenadier Guards.
Sub-Lieutenant W. Ginman, R.N.V.R.
Lieutenant R. H. Keate, R.N.

(No officer of the Imperial Yeomanry joined the Institution during the month.)

2. At the Anniversary Meeting, held at 4 p.m. on Tuesday, 6th March, the following officers were appointed to fill vacancies on the Council:—

Captain Honble. A. E. Bethell, C.M.G., R.N.
Colonel L. A. Hale (re-elected).
Brigadier-General C. G. Donald, C.B. (re-elected).
Colonel Honble. O. V. G. A. Lumley, h.p., late 11th Hussars.
Commander W. F. Caborne, C.B., R.N.R.
Colonel W. A. Hill, C.B. (re-elected).

Colonel R. B. Colvin, C.B., Essex Imperial Yeomanry.
Colonel T. S. Cave, V.D. (re-elected).
Colonel W. C. Horsley, V.D., 20th Middlesex V.R.C. (Artists).

3. The Gold Medal of the Institution for the year 1905 and the first Trench-Gascoigne Prize of thirty guineas have been awarded to Major W. C. Bridge, South Staffordshire Regiment, D.A.A.G., Mauritius. The second Trench-Gascoigne Prize of thirty guineas has been awarded to Major H. R. Mead, 116th Mahrattas.

The Essays written by the following officers were recommended by the Referees for publication in the JOURNAL, and will consequently appear in due course :—

Major A. B. N. Churchill, R.G.A.
Major R. A. Johnson, 1st V.B. Hampshire Regiment.
Major J. F. Cadell, R.F.A.

The Referees who adjudicated on the Essays were :—
Major-General Sir G. H. Marshall, K.C.B.
Major-General Sir T. Fraser, K.C.B., C.M.G.
Lieut.-Colonel C. E. H. Hobhouse, M.P.

4. The first prize of one hundred guineas for the Special Military Essays for 1905 has been awarded to Captain F. P. Dunlop, Worcestershire Regiment. The second prize of thirty guineas has been awarded to Colonel F. N. Maude, C.B., 1st Hampshire Royal Engineers (Vols.), late R.E. The third prize of ten guineas has been given to Major G. F. MacMunn, D.S.O., R.F.A.

The Essays written by the following officers were recommended by the Referees for publication :—

Captain S. C. Birch, h.p., late Northumberland Fusiliers.
Major R. F. Sarsbie, R.E.
Major J. F. Cadell, R.F.A.

The Referees who adjudicated on the Essays were :—
Field-Marshal Sir H. E. Wood, V.C., G.C.B., G.C.M.G.
The Right Honourable Sir Charles Wentworth Dilke, Bart., M.P.
Brigadier-General F. S. Robb, C.B., M.V.O.
Colonel H. W. Pearse, D.S.O.
H. Spenser Wilkinson, Esq.

5. The Council have decided to publish the two Gold Medal Prize Essays and three of the other Essays, sent in for competition and recommended by the Referees for publication, in the April No. of the JOURNAL; and at the same time the six best Essays for the Special Military Essay Competition will be published and issued to Members in the usual way, as a supplementary number. Both sets of Essays will also be published in pamphlet form, and can be obtained by the public, price one shilling, post free, on application to the Publisher, Mr. C. Gilbert-Wood, Granville House, Arundel Street, Strand, W.C.

The anonymous donor of the one hundred and fifty guineas for the special Prize Essay competition has kindly contributed a further fifty pounds towards the expense of circulating the Prize and Commended Essays in question.

6. In view of applications having been received, the Council desire to intimate that the Museum is available only for Conversaziones and Receptions of recognised learned and scientific Societies and similar Institutions. The Theatre and a Committee Room can be used for meetings of Naval and Military Societies and Institutions, the fee being nominal. Applications should be addressed to the Secretary.

7. A specimen of an English Long Bow is required for the Museum.

THE TOLERATION OF ENTERIC FEVER BY THE ARMY.

By H. E. LEIGH CANNEY, Esq., M.D.

Wednesday, 8th November, 1905, at 3 p.m.
Major-General Sir T. FRAZER, K.C.B., C.M.G., R.E., in the Chair.

IN November, 1901, I had the honour of placing before the members of the R.U.S.I. a scheme for the suppression of enteric fever (and other allied diseases) in Armies in the field. The unanimous approval with which this scheme was then received, and the earnest consideration given, in the discussion following, by members and authorities representing all branches of the Service, as well as many civilian authorities, resulted in steps being taken in South Africa during the last winter of the war which led to the saving of heavy losses, and entirely supported the optimistic forecast then given.

On the 6th May of the following year the Secretary of State for War stated in the House of Commons that "In the camps and stationary garrisons steps have been taken to have the water boiled, and special officers selected to deal with the sanitary work of the district and the outbreak of disease. . . . The principal medical officer reports that the enteric cases mostly come from the columns. For mobile columns a scheme for providing safe water to fill the soldiers' water-bottles at all times has been prepared, and measures are being taken to carry this out." This was reaffirmed later by Surgeon-General Sir William D. Wilson. He stated: "Last year (1901) I recommended in South Africa that wherever there was a stationary body of men means should be taken for boiling the water, and in that way enteric was stamped out. . . . The columns while on the march were unable to boil their drinking water," hence the enteric came "mostly from the columns." The war being then over, it became necessary to urge the organisation of sanitation on a permanent basis in the Army, and on the 31st July, 1902, it was stated that experiments on sterilisation of water were in progress, but that the scheme had not yet been sufficiently tested to justify its establishment on a permanent basis.

On the 11th August, 1904, two years later, it was officially stated in the House of Commons that "the Medical Advisory Board recommend the appointment of specialist sanitary officers to army corps and commands. . . . Instructions regarding the sterilisation of all fluids employed as drinks, which are applicable to manœuvres, service abroad and active service, have been included in the 'Manual of Combined Training'; heat, and in some instances, filtration, are the means recommended. Lectures were regularly given

to cadets at Sandhurst and Woolwich, and a more advanced course in military hygiene was provided for officers at the Staff College. Instructions in hygienic matters were also given by the specialist sanitary officers. The regulations were also being revised in the direction of devolving more responsibility upon non-medical officers in the supervision of sanitary services in barracks and camps." This recommendation of the Advisory Board practically embraced the "essentials" of the scheme which met with your approval in 1901.

On the 11th August, 1905, however, in reply to Sir Henry Kimber's question as to whether these recommendations had been carried out and suitable apparatus for the sterilisation of fluids at manœuvres, for service abroad and for active service had been supplied to the Army in India and South Africa, the Secretary of State for War stated that the Advisory Board had not made "such a sweeping recommendation, and that sterilisation experiments were still going on." During this interval of four years, absorbed in experiments, which might reasonably have been completed within two months, the Army had been left exposed to profound danger if mobilised, had suffered a further loss by the incidence of over 10,000 cases of enteric fever in India and South Africa, and the conception by the authorities of the importance of organisation to prevent these evils had become obscured.

Justly, it seems, Lord Roberts stated on the 10th July, 1905, in the House of Lords: "The lessons of South Africa have been forgotten (by the nation), and I have no hesitation in stating that our armed forces, as a body, are as absolutely unfitted and unprepared for war as they were in 1899-1900." The nation, however, has not forgotten the absolute neglect of sanitation in the South African War, the fatal lists of "enteric except otherwise stated," and, in common with the leading thought in the Army, impatiently awaits an organisation—methodical, continuous, and complete—to prevent these evils. During the South African War the Army authorities were waiting for reports of American experiences in the Philippines, as regards sanitation and water supply, and now all sanitary reforms are held up pending reports from the Japanese Army. Considering that the foundation of any preventive methods is based upon the scientific results attained by research in this country, it is not creditable that in the Army we should neglect to take the lead in organisation to obtain the results that research has made possible. It was consequent upon this attitude that the condition of the British Army at Bloemfontein was precisely similar, from the point of view of sanitary organisation, to that of the Royalist and Parliamentarian Armies close to Reading in 1642, as Dr. Willis, then at Christchurch, Oxford, states: "Both sides could not fight, although close to each other; either side left off and fought, not with the enemy, but with the disease, being beset with a heavy and long languishment."

Doubtless a similar explanation of the impasse was given in 1642 as in 1900, when Lord Roberts telegraphed: "When we arrived at Bloemfontein we had an abnormal number of sick, due, no doubt, not only to the peculiarly exhaustive nature of the march, but also to the terribly insanitary conditions of our camp at Paardeberg, where the only water available for drinking purposes flowed down from the Boer camp, 1½ miles up the river, which was crowded with dead animals in a state of decomposition." Everyone, of course,

knows that this is precisely what one expects in war; the only wonder is that the Army in 1900 should, in the light of modern methods of prevention, be content to tolerate the conditions of 1642. It was consequent, also, on this attitude that the general officer commanding at Colenso was prepared to inflict a grave blow on national and military respect by surrendering a large garrison and important base because he, with others, had neglected in the preceding months, and even before the war, to initiate the sanitary measures which he knew were imperative, and which, when applied a year later on the same spot, brought distinguished success.

Five years have passed, and we ask if the Army was mobilised to-morrow to march over the same ground, what are the mechanical means, the technique, the training of officers and men at the Army's immediate disposal to escape the precisely similar disasters awaiting them?

In my previous lecture, it was shown that unless special precautions were taken, the incidence of these evils were a certainty in war; that they would cause a loss of efficiency, mobility and strength, an embarrassment of transport, a chaos in hospital arrangements, far surpassing that caused by the enemy's weapons. The accompanying chart (Plan IV.) illustrates this incidence, and the appalling disasters resulting. This chart, representing deaths only, conveys but a limited idea of the chaos produced by disease. To estimate comparatively the paralysing effect of sick and wounded, the columns must be lengthened out twenty-five times in the case of the former, to only five times in the case of the latter. I pointed out how this enemy has arrested operations for a shorter or longer time as in the Civil War in England; the first year of the Crimea; the Russian forces in Central Asia; the French Army in Madagascar; and lately, our own Army at Bloemfontein, the human enemy being often only a passive onlooker.

It was shown that in the midst of insanitary surroundings, often specifically contaminated, considerable bodies of men may be maintained practically unaffected by enteric fever (dysentery or cholera) by suitable precautions. Such was the case in the Abyssinian, Suakin, and Ashanti campaigns; in the prisons of Pietermaritzburg, Lucknow, and Ahmednagar; in Ladysmith after 1901; in the case of the staff of the vast enteric fever hospital at Mooi River, Natal; in the fixed camps and garrisons during the last few months of that war; and in the very large camp of civil workmen constructing the Assouan Barrage. Recently, in war on the largest scale ever known, you have seen in the Japanese Army a demonstration of striking success, following a conscientious attempt to carry out the essentials of the scheme I placed before you two years before this war commenced. There is strong evidence for asserting that enteric fever is entirely preventable in civil life, in camps, and in advancing troops.

I pointed out that to obtain this immunity the following conditions were essential:—

1. A trained "water-section" of 2 per cent. of the strength, non-combatant.
2. A trained "pioneer section (sanitary)" of 2 per cent. of the strength, combatant.
3. The appointment of expert sanitary officers.

4. The training and education of all officers in sanitary methods.
5. The responsibility of all non-medical officers for the executive sanitary work of camps or units.
6. Responsibility of the same officers for the incidence of enteric fever, dysentery and cholera in their units.
7. The education and training of the men in the advantages to be obtained by themselves and their comrades.
8. The transport of the "water-sections" to be used for no other purpose, and largely independent of all other transport. The transport of reserve fuel, etc., to take precedence, if required, of everything except one day's ammunition.
9. The establishment of a tradition that it is dishonourable and a "crime" to use any fluids for drinking purposes not "approved" or allowed.

I further showed that one mule per 100 men will render that unit independent of the general transport for two or three days, supplying it with all the tea, soup, sugar, and fuel required for its two sterilisers during this time; that these two sterilisers will serve 100 pints of sterile soup, cooled to the drinking point, within 9 minutes. The general transport was shown to be vastly reduced.

To-day I wish to invite your attention to the present sanitary organisation in the Army and its consequences, as we see it in the British Army stationed in India and South Africa, and the probable beneficial results that might have been expected during peace under such a scheme as that we have just considered.

The facts, figures, and statements upon which this review is based are the official reports of the Army Medical Department. They mainly refer to the year 1903, the last year for which any reports are published, being a year and a half after the scheme referred to was proposed. In the case of India, I shall have occasion to refer to the years immediately preceding that date, in order to illustrate the points we are considering.

In the year 1903, the British Army was represented in India and South Africa by a total of 97,293. The loss suffered by this force by death, invaliding, and "discharged finally as medically unfit," amounted to 5,995, or rather more than 6 per cent. So great a loss annually to the Army in these countries, representing only the outcome of the struggle in some of the more serious cases of illness, calls for very serious reflection. During this year in this force, in India and South Africa, there were 94,164 admissions to hospital, and on the average, each admission lasted 27·47 days in South Africa, and over 22 days in India. Every soldier in South Africa had, on the average, 21·91 days, and in India, 23·06 days of sick time. Thus, in India, 1,605,275 days were passed on the sick list, and 606,468 days in South Africa, or a total of 2,211,743 days. Over 60 per 1,000 were constantly ill out of the total force.

This amount of illness and loss suffered by the troops in India and South Africa, represents not an unusual condition, the report stating that "the health of the troops in India was exceptionally good," and from South Africa the sanitary conditions are reported as better than the previous year.

When we analyse this sick list, we find it may be divided into the *Avoidable* and the *Unavoidable* (in the present state of medicine). The *Avoidable* illness may safely be estimated at one-third of the total, and in all probability, one-half. The *Avoidable* illness is found to contain a large amount of illness affecting very seriously the after health of the individual soldier and his possible offspring, and, therefore, of great importance to the national hygiene, but not seriously compromising the fighting capacity of the Army.

It is, however, to the remainder or the greater part of the remainder of the *Avoidable* illness that I wish to direct your attention. It consists of a heavy incidence of enteric fever, dysentery and allied diseases, the causation and prevention of which are well known. Their appearance in an Army in the field portends widespread weakening of the fighting strength, embarrassment of the transport, delay and possible paralysis of the whole Army. Hence we must, from a military point of view, regard these *Avoidable* diseases in quite a more serious light. In the future, when suitable means and methods are put in force by the Army authorities, to prevent these diseases, the infringement of orders will be regarded as a serious "crime," to be dealt with accordingly. Men will learn at manœuvres and on active service that everything taken as food or drink must be limited to what is "approved," and that the greatest attention to cleanliness of camp is a duty of the highest order in war. The occurrence of these diseases will be considered as damaging to the reputation of units or corps, and as compromising the individual.

Of these illnesses, if we consider enteric fever alone, we find that in year 1903, the incidence of this disease was more than twenty-four times as great in India, and in South Africa fifty-two times as great as that in the Army in the United Kingdom, the smaller incidence in India being due chiefly to the fact that the drafts during 1902-03 were very largely from South Africa, where they had been extensively exposed to enteric infection for periods of two or more years. Had it not been for this factor, it is probable that the incidence of enteric fever in India in 1903 would be shown to be as great as, or even greater than, averages taken from the previous twenty years. Thus, we find there were 1,366 admissions for enteric in India in 1903, or 19·6 per 1,000, which, compared with the mean for the five years, 1890-94, of 1,398 cases, or 20·4 per 1,000, is practically the same. From the time of the earliest reliable statistics of enteric fever, sixteen years ago, to 1903, the incidence of enteric remains stationary in the British Army in India.

If we turn to South Africa in the year 1903—a year after the declaration of peace—there were 1,155 admissions for enteric fever, or 41·7 per thousand, or twice as great as the incidence in India, and enteric caused 46 out of every 100 deaths.

When we realise that the incidence of enteric in the Army at home has been reduced to one-seventeenth of what it was between 1837-46, that of Gibraltar to one-eighteenth, and that of Malta to one-fortieth, we have a condition in India comparable only, though considerably worse, with that of the Army in England long before sanitation was known, and a condition in South Africa more serious still. As far as the Army in India and South Africa is concerned, sanitary science, in its preventive capacity in dealing with enteric fever, might as well have never existed.

If we consider the chief cause of the remainder of the preventable disease so dangerous to Armies in the field—dysentery—we find some evidence in Indian records of progress in prevention, though in South Africa the incidence remains about the same as in India 10 years ago. It is probable also that some of the improvement in India may be only apparent and due to a large proportion of the drafts being arrivals from South Africa, where the exposure had been very thorough to insanitary conditions. There still remains some improvement, however, in the admissions from this cause, and this is perhaps some consolation in return for the sanitary measures already in force. It is probable also that the prevention of dysentery may be in a measure proportionate to the approach to a state of sound sanitation, whereas in the case of the prevention of enteric fever nothing less than the utmost care in detail throughout the whole period of residence in an infected district is likely to reduce the incidence, a single error in years of care being the undoing of a susceptible individual. The preventive methods to deal effectively with enteric fever must be precise, thorough, and constant, and they cover at the same time all the known avenues of dysentery and cholera. We will therefore limit the discussion to enteric fever. The causation of enteric fever, and the avenues of approach to man are well known, and generally accepted. We may here state that the natural habitat of the bacillus in its virulent form is the human body, and though various media, such as soil, refuse, clothing, and possibly the air, afford it a temporary means of existence, enabling it to cause sporadic cases, yet the chances of its disappearance from a camp or community are very great if its wide diffusion in its human host is prevented by protection of the liquid avenues, especially the water supply, from contamination. The bacillus leaves the body by the excreta, and gains access to another individual by the mouth and stomach. Dissemination in the dry state, as dust particles through the air, is possible, but not common. To estimate the potency of any particular avenue of typhoid to man, it is essential that all other avenues must be rigidly closed at the time. Without this all conclusions drawn from such observations are mere assumptions, and valueless as data. For this reason attempts to indicate the special avenue of enteric in some vast military camps (Bloemfontein, Kroonstad, the United States of America Volunteer camps), absolutely destitute of any organised plan of sanitation and equally devoid of any means of dealing with the epidemics — every avenue of the bacillus being left unguarded — are valueless. If the water and liquid avenues to a camp or community are protected, epidemics will not occur, the disease disappearing after a diminishing series of sporadic cases if duly isolated. If the liquid avenues only are closed, though partially, good results may possibly follow, as in the Abyssinian, Suakin, and Ashanti campaigns. If the most elaborate means are taken in a camp to close the avenues by flies and dust, and the infected liquid avenues are not completely guarded, large epidemics will occur, as at Quetta (1900), and the Boer camp in Ceylon the same year. If the water avenues are protected, and ordinary precautions taken against infection by flies and dust, there will be no epidemic, as in the Barrage camps at Assouan, the cases of prisons, and the staff of the Mooi River Enteric Fever Hospital.

There is no known instance of a community, civil or military, having thoroughly protected itself against all the water avenues open

to the enteric bacillus, suffering from anything but sporadic cases. There is, as yet, no known instance in war or in military camps where the water avenues and other avenues available to the bacillus have been all closed in the sense in which they will later on come to be regarded as closed, that is, under the supervision of specially trained men carrying out an accepted technique. And yet, as I have shown, practical extinction of the disease has occasionally resulted from incomplete efforts at prevention.

We may conclude as follows:—

1. Enteric fever is a preventable disease in armies as in civil communities.
2. The extent to which it is prevented depends upon the intelligent action of the community or camp.
3. The weight of evidence from India, Egypt, and South Africa is immensely in favour of the paramount importance of the liquid avenues, especially at the outset of epidemics. The spread of the disease by the subsidiary avenues, flies, contact, or possibly dust, may now take place; but the main avenues of importance are still the water avenues.
4. It is not possible to affirm that the liquid avenues to an Army are closed unless the sterilisation and distribution of the water are carried out by specially trained men.
5. The greatest need for cleanliness of camps, and precise attention by every man to the instructions concerning excreta is of vital importance, owing to the fact that in the early stages of this disease an isolated case may otherwise be scattering infection broadcast.
6. Early isolation of suspected cases with disinfection will prove of enormous value.

Having drawn your attention to the main lines on which sanitation must be organised to prevent enteric in camps or in the field, I will now illustrate, from official records for the last six recorded years, the manner in which the Army in India and South Africa has organised sanitation in this direction, which I think you will agree with me is ample justification for the title of my paper. I shall note instances of improved methods and of energetic measures of dealing with the danger, springing from individual initiative, isolated instances too often rendered abortive by the passive indifference shown by the Army as a whole.

Water.

In war, no matter in what country, all drinking water is to be regarded as contaminated, and must be sterilised. It is said that the Japanese send forward experts to examine by chemical and bacteriological means water supplies, and mark them as suitable for drinking purposes. Such I believe is also the practice of the German Army. It is an unreliable and generally impracticable method, the chemical examination being useless and the bacteriological requiring 24 hours' delay. Both these Armies, if it be their practice, will have to abandon it, if they are to come up to the standard we have set before the British Army. At present, however, we are concerned with

the organisation and training in peace with a view to war. For this purpose, fortunately for the British Army, a large portion of it is compelled during peace to train in countries such as India and South Africa, where the generally polluted condition of all rivers, municipal water supplies, etc., is known, and other sanitary defects so universal as to very closely resemble the environment which I have shown, it is to expect on mobilisation for war in any country. It is compelled, therefore, to initiate the complete sanitary measures which are to protect it in peace, and it is of the highest importance that these means or measures should possess mobility, and that the Army should not find on mobilisation that portions of its sanitary equipment, organisation, or training possess a local character only, and that in this or that respect it is left at the critical moment unprotected.

What are the measures taken by the Army to deal with this contaminated water at stations generally. The R.A.M.C. recognises the universal danger, and the order goes forth, "All drinking water to be boiled." How is this carried out? Various means are in force, boilers, large cauldrons, steam sterilising cisterns, etc., all possessing the grave defect, immobility. What advantage, then, to the soldier, supposing him thus protected in peace, if, when the order "Mobilise" comes over the wires, he finds himself sanitarily immobile? He is now led forth gaily, naked before his real foe, to find himself, a few days later, at the very moment of all his life and his country's, a helpless, immobile mass on the lines of transport, requiring nurses and liquid food. Is this war; is this organisation?

We will now pass from the means of sterilisation, to the method the Army employs to sterilise this water known to arrive at camp contaminated, and resembling the water which will be met with in war. Every authority will advise you that the sterilisation, storage and distribution of water for drinking purposes known to contain either cholera, enteric, or dysenteric organisms, can only be safely carried out by specially trained men. The Army in India and South Africa employs only untrained men, often natives, consequently the water is frequently unsterilised, and if sterilised, is reinfected through the ignorance of the men employed. The South African Commission on Enteric reported:—"The supply of pure (sterilised) water will never be a success, and be nothing but a myth, until there is in every regiment a water supply staff, whose sole duty is to supply sterilised water." Medical officers in India, who have watched the process of sterilisation, have officially reported it as "a most dangerous proceeding."

In the official report for India (1902), the method of sterilisation and storage, general throughout Indian stations, is described in detail, and no less than 4 or 5 distinct modes of possible reinfection of this supposed sterilised water are given, all of which may happen daily at any tank of drinking water, and concludes: "Short of detailing soldiers to watch every 'bhisti' all the time he is doing his work, it is impossible to protect water in barracks." The R.A.M.C. urged reforms, but the same dangers were reported in 1903. Epidemics have been traced to this "boiled" water, and the bacillus found in it (Lucknow, 1897). The same errors in method are reported (1903) from South Africa, and neglect to carry out the sanitary details or instructions as to boiling, resulted in much enteric (Kroonstad).

I will now give three instances where the sterilisation of water was placed successfully in special hands, but not trained. 1. The Liverpool Regiment in the South African War appointed a water staff, who were relieved of other duties, and kept up a continuous supply of pure filtered water or tea. Three battles were fought on the march. The system was found perfectly successful and feasible. 2. The same was done by the Naval Brigade employing nothing but boiled water for six months on the march. In both instances the men were not allowed to drink from any other source. 3. At Standerton (South Africa), in 1903, report states, "the sterilisation of water reached a state of perfection not approached by any other station. It is chiefly due to the thorough methods adopted for boiling and filtering drinking water that the freedom of the garrison from enteric and allied diseases during the latter part of the year must be attributed. A special staff of men were detailed to superintend the work."

We see then, that the Army sanitarily immobile by reason of equipment, even if provided with rapid mobile sterilisers, admirably adapted for field service, the invention of which is entirely due to civil initiative and seems but little to interest the Army, would not be in a position to make effective use of them, having no trained men upon whom they could rely, and without these I have shown, no certain results could be obtained.

Thus the soldier would still find himself immobile from sickness beside his steriliser in war, as in peace, complaining, as was recently the case in the *Times*, "all our schemes for sterilisation of water by boiling or otherwise have had no effect in controlling its incidence." To expect that a poor ignorant outcast "Bhisti," without training, is for a mere pittance, going to interest himself in the details of the sterile drinking water of your barracks, "by order of the Regimental authorities," and what is far more important, conduct you safely though the turmoil of war to the front and there keep you efficient, is the last thing in quixotism.

Supposing, however, the safe delivery of this water by trained interested hands,—*i.e.*, by a "water-section"—is provided within the barracks, and that the admission of articles from without liable to carry infection to the soldier within barracks, is also placed under the control of this trained man and his trained superior (whoever he may be), still, the field of liquid opportunities open to the bacillus for attack is not confined to the barracks in peace, or to the camp in war. In either case, on detached or outpost duty in war, or during time spent on duty or off duty beyond the barracks in peace, he will have numerous opportunities of exposure to infection.

How are these dangers to be met? In war by providing the soldier on such duty with similar minute sterilisers on a portable scale, and in peace by an extension of the area of duties of the trained "water-section" to the possible or allowed haunts in the bazaars, etc. The "water-sections" of units or corps being interested, as I have said, either by promotion pay or distinction, in the results of their work, will know how to secure these haunts rapidly and continuously. They will carry the technique of their barracks into bazaar restaurants, "Soldiers' Homes," "Salvation Army Homes," "Royal Army Temperance Institutes," rifle ranges, etc., places known to have been responsible for a vast amount of enteric and allied illnesses.

How does the Army in India or South Africa protect the soldier beyond the barracks?

the organisation and training in peace with a view to war. For this purpose, fortunately for the British Army, a large portion of it is compelled during peace to train in countries such as India and South Africa, where the generally polluted condition of all rivers, municipal water supplies, etc., is known, and other sanitary defects so universal as to very closely resemble the environment which I have shown, it is to expect on mobilisation for war in any country. It is compelled, therefore, to initiate the complete sanitary measures which are to protect it in peace, and it is of the highest importance that these means or measures should possess mobility, and that the Army should not find on mobilisation that portions of its sanitary equipment, organisation, or training possess a local character only, and that in this or that respect it is left at the critical moment unprotected.

What are the measures taken by the Army to deal with this contaminated water at stations generally. The R.A.M.C. recognises the universal danger, and the order goes forth, "All drinking water to be boiled." How is this carried out? Various means are in force, boilers, large cauldrons, steam sterilising cisterns, etc., all possessing the grave defect, immobility. What advantage, then, to the soldier, supposing him thus protected in peace, if, when the order "Mobilise" comes over the wires, he finds himself sanitarily immobile? He is now led forth gaily, naked before his real foe, to find himself, a few days later, at the very moment of all his life and his country's, a helpless, immobile mass on the lines of transport, requiring nurses and liquid food. Is this war; is this organisation?

We will now pass from the means of sterilisation, to the method the Army employs to sterilise this water known to arrive at camp contaminated, and resembling the water which will be met with in war. Every authority will advise you that the sterilisation, storage and distribution of water for drinking purposes known to contain either cholera, enteric, or dysenteric organisms, can only be safely carried out by specially trained men. The Army in India and South Africa employs only untrained men, often natives, consequently the water is frequently unsterilised, and if sterilised, is reinfected through the ignorance of the men employed. The South African Commission on Enteric reported:—"The supply of pure (sterilised) water will never be a success, and be nothing but a myth, until there is in every regiment a water supply staff, whose sole duty is to supply sterilised water." Medical officers in India, who have watched the process of sterilisation, have officially reported it as "a most dangerous proceeding."

In the official report for India (1902), the method of sterilisation and storage, general throughout Indian stations, is described in detail, and no less than 4 or 5 distinct modes of possible reinfection of this supposed sterilised water are given, all of which may happen daily at any tank of drinking water, and concludes: "Short of detailing soldiers to watch every 'bhisti' all the time he is doing his work, it is impossible to protect water in barracks." The R.A.M.C. urged reforms, but the same dangers were reported in 1903. Epidemics have been traced to this "boiled" water, and the bacillus found in it (Lucknow, 1897). The same errors in method are reported (1903) from South Africa, and neglect to carry out the sanitary details or instructions as to boiling, resulted in much enteric (Kroonstad).

I will now give three instances where the sterilisation of water was placed successfully in special hands, but not trained. 1. The Liverpool Regiment in the South African War appointed a water staff, who were relieved of other duties, and kept up a continuous supply of pure filtered water or tea. Three battles were fought on the march. The system was found perfectly successful and feasible. 2. The same was done by the Naval Brigade employing nothing but boiled water for six months on the march. In both instances the men were not allowed to drink from any other source. 3. At Standerton (South Africa), in 1903, report states, "the sterilisation of water reached a state of perfection not approached by any other station. It is chiefly due to the thorough methods adopted for boiling and filtering drinking water that the freedom of the garrison from enteric and allied diseases during the latter part of the year must be attributed. A special staff of men were detailed to superintend the work."

We see then, that the Army sanitarily immobile by reason of equipment, even if provided with rapid mobile sterilisers, admirably adapted for field service, the invention of which is entirely due to civil initiative and seems but little to interest the Army, would not be in a position to make effective use of them, having no trained men upon whom they could rely, and without these I have shown, no certain results could be obtained.

Thus the soldier would still find himself immobile from sickness beside his steriliser in war, as in peace, complaining, as was recently the case in the *Times*, "all our schemes for sterilisation of water by boiling or otherwise have had no effect in controlling its incidence." To expect that a poor ignorant outcast "Bhisti," without training, is for a mere pittance, going to interest himself in the details of the sterile drinking water of your barracks, "by order of the Regimental authorities," and what is far more important, conduct you safely though the turmoil of war to the front and there keep you efficient, is the last thing in quixotism.

Supposing, however, the safe delivery of this water by trained interested hands,—*i.e.*, by a "water-section"—is provided within the barracks, and that the admission of articles from without liable to carry infection to the soldier within barracks, is also placed under the control of this trained man and his trained superior (whoever he may be), still, the field of liquid opportunities open to the bacillus for attack is not confined to the barracks in peace, or to the camp in war. In either case, on detached or outpost duty in war, or during time spent on duty or off duty beyond the barracks in peace, he will have numerous opportunities of exposure to infection.

How are these dangers to be met? In war by providing the soldier on such duty with similar minute sterilisers on a portable scale, and in peace by an extension of the area of duties of the trained "water-section" to the possible or allowed haunts in the bazaars, etc. The "water-sections" of units or corps being interested, as I have said, either by promotion pay or distinction, in the results of their work, will know how to secure these haunts rapidly and continuously. They will carry the technique of their barracks into bazaar restaurants, "Soldiers' Homes," "Salvation Army Homes," "Royal Army Temperance Institutes," rifle ranges, etc., places known to have been responsible for a vast amount of enteric and allied illnesses.

How does the Army in India or South Africa protect the soldier beyond the barracks?

Though some of these places receive occasionally some attention, there is no attempt at continuity and trained method. Considering the bazaars and resorts generally, there can be no question that, however finely conceived and carefully executed the organisation against enteric in a camp or barracks might be, the daily opportunity open to the men of infection through drinks or food in the restaurants of bazaars or towns, will continue to undo completely this one-sided attempt to obtain results. In these resorts the rule is polluted drinking water, polluted aerated waters, food of all kinds unprotected, butter, milk, ice, raw vegetables, salads, etc., all contaminated and sold largely to regiments, and to individual soldiers. Station after station records epidemics caused by these bazaars, and arrested or diminished when the bazaars were placed "out of bounds." This grave danger is drawn attention to in every A.M.D. Report. The free access of the men to these numerous unprotected avenues of enteric rendered the elaborate experiment undertaken by the R.A.M.C. at Quetta (1899-1900) of making the barracks and camp a model of cleanliness and sanitary organisation, especially against infection by flies and dust, quite abortive, terminating in the largest epidemic in India for that year.

In 1900 the medical officer for Peshawar stated: "Enteric fever will continue to decimate the troops in this country *until regimental bazaars with their overcrowded and insanitary population are abolished altogether.*" If such a step were taken, well and good; but if they are retained they must be rendered safe to the men, and the men, by education, safe in the bazaars, I would propose that the men should indicate the resorts where they wish to take drinks or food. The owners are forthwith asked if they are ready to conform to the methods that will be applied and inspection whenever necessary. The signal is then hung out indicating a resort as approved, the "water section" supply the mineral waters from the unit or corps at less than the native price, and place it on the Army shelf they themselves fix, and show the owners the method of sterilising glasses, etc., covering eatables, and storing sterilised milk. On returning to barracks the soldier reports whether he has drunk anything, and where, to a recording "water section." It will not be long before the owner of the restaurant is either doing a flourishing business or his business is wound up; the same applies to the various homes or institutes frequented. Certain articles, such as salads, raw vegetables, strawberries, melons, etc., will have to be interdicted altogether, on account of difficulty of sterilising, or grown in special gardens under supervision; the same applies to the admission of lucerne to barracks for horses, which is often contaminated with enteric bacilli.

It will be observed that when all is done to make it reasonably certain that the willing soldier will escape the water avenues of enteric in barracks, bazaars, and in the field, there still remains the reckless or wilful soldier to be dealt with—the man who will drink at the swimming bath, the washing water tap, or the irrigation channel. He can only be protected by other means. It must at once be taught that the man who will risk enteric in barracks or at manœuvres will probably do so in war, and such a man is a coward. Just as enteric must be regarded as a disgrace to the unit or corps, so must it be to the individual. He must be taught that to get enteric is to disgrace his regiment, to endanger his comrades, and is liable to hinder the reward due to his "water section" for success.

In India and South Africa regiments and corps must annually be listed in the order of sanitary efficiency; those at either end of the list will soon become distinguished by suitable epithets. These lists would be posted prominently in barracks, and it would be obvious that generals arranging campaigns would prefer to have the "Sterilised Fighting Dragoons" or the "Bacilli Guards" at the front for more reasons than because they would not have to carry them back to the base; whereas such duties as guarding hay-stores or towns not far from the base hospitals, or minding the cows, would be suitable employment for the "Liquid Nourishment Rifles," the "21st Safe-Range Field Artillery," or the "Devil's own Headaches." Doubtless, officers, "water sections," and comrades would soon bring effective means to bear to bring such perverse men, if they exist, into line.

Aërated Waters.—Before leaving, for the present, the liquid avenues of the bacillus in camps, which must pass under the control of the "water sections," mention must be made of aërated waters. Countless soldiers have gone down with enteric in India and South Africa from polluted soda water, etc., sometimes made in bazaars or towns and sometimes by regimental factories, in the former practically always, and in the latter not rarely, contaminated or liable to be. In 1903 in South Africa numerous specimens were examined at the Army Medical Laboratory from various towns; gross pollution was found in the majority, those of Pretoria being found even more polluted than the polluted municipal water supply from which they were made. A big epidemic was raging in the Pretoria garrison at the time. I think you will agree that the toleration of any badly prepared and infected mineral waters in garrisons, in hospitals, in the permitted bazaar or town restaurants, on the line of march, or in travelling by rail, being easily preventable, is criminal, and should no longer be allowed. Sterile mineral waters, prepared under the supervision of "water sections" and their superiors, should alone be allowed in the Army abroad.

I have now, I think you will agree, amply justified the demand made four years ago for an organised trained "water section," controlling all the liquid avenues open to the men in barracks, bazaars, and in the field. I have shown that water, the one thing important in sanitation in war and peace, is practically no trained man's business in the Army, that the methods are hopelessly defective, and only partial in action, and that the present high incidence of enteric is directly due to these causes.

Protection of Other Avenues of Enteric.

We will now pass to the consideration of the diffusion of enteric by the remaining avenues; by flies, and possibly by dust. I have said that if the water avenues are closed there will be no epidemic—at least there is no instance on record—only possibly sporadic cases. These cases, in the absence of direct evidence, may be attributed to the action of flies or direct contact. Surgeon-General Sir T. Gallwey recently stated he regarded the enteric in South Africa as caused by the "grime, dust, and dirt of war" rather than by water. This opinion is not borne out by expert opinion or evidence from any country. The present Professor of Medicine at the R.A.M. College reported, after a searching inquiry in Natal in 1898, conclusively

against this view, and in a direct contrary sense. Dr. George Turner, Medical Officer of Health for the Transvaal, engaged by Lord Roberts in the sanitary organisation of military camps, after six years' experience in South Africa, reported in 1902 on the causation of enteric in the Army. After concurring in the inconclusiveness of the reports of dissemination by dust of enteric in India, he states: "I have never had any reason to suppose enteric was attributable to either dust or flies. . . . On one occasion only had I any grounds for supposing that dust was concerned in the production of enteric, and on that occasion the dust appeared to have acted through the agency of water used for drinking." He concludes: "Emphatically, enteric in South Africa is almost entirely due to polluted water." The late distinguished expert, Dr. Washbourn, reported during the war in the same sense. The Expert Commission on Enteric in South Africa reported: "The most conspicuous sanitary defect almost everywhere in this campaign has been the impurity of the drinking water. The matter was viewed as one of the exigencies of war which it was impossible to remedy, *instead of as a serious difficulty which, under any circumstances, must be overcome.*" I have, moreover, shown elsewhere that in every instance in India recorded up to 1901, where epidemics have been attributed to these causes, that the evidence is not clear, and the water avenues have been open to the men.

I have quoted these authorities in support of the statements that if the water avenues are protected only isolated cases can occur, and if these are properly handled no epidemic can occur. In actual practice I have shown that all experience in the Army and in civil life is in accordance with this statement. It is of vital importance to the Army to realise this, and not to be led into supposing that if they protected the water avenues they would still be scourged with epidemics of enteric. With a view, however, to at once preventing any possible chance of infection by these avenues, a proper system of camp conservancy is imperative, and in this all authorities are agreed.

Considering the great importance attached by the Army Medical authorities to the proper disposal of excreta of camps, we should expect to find the greatest precision in carrying out the methods prescribed and the strictest supervision of the same. In India and South Africa there is, however, neither one nor the other. From numerous stations grave neglect of instructions is the rule. From Poona, Nasirabad, Meerut, Umballa it was reported the men will not carry out the system prescribed. The sanitary officer reporting from Umballa in 1902 states that as a result of numerous inspections of latrines in every station of the Punjab, the soldier practically never carries out the orders for the protection of this avenue.

From South Africa (1903) the same negligence is frequently reported by medical officers, and at some stations Kaffirs were employed to do the work the men themselves should have performed.

I think you will agree with me that the creation of properly trained "pioneer section" men, having as duties the surveillance of camp cleanliness, and the authority of camp police, to see that the men carry out the orders and instructions laid down, cannot be delayed, and that toleration has gone too far in this direction as in others.

We have seen that with suitable organisation the access of enteric to camps in infected countries can be prevented, but only by the creation of "water-sections" and "pioneer sections" in every regiment or unit, the former having no other duties whatever. The organisation of the sanitary service I will refer to later.

I will now draw your attention to the manner in which the Army in India proceeds to take the field sanitarily. "Field service, in the train of which enteric always follows," is an axiom of every Army Medical Report from India. From manœuvres and marches numbers of cases are reported at numerous stations throughout India, all attributed by the medical reports to drinking polluted water. I have shown that, if ordered to mobilise, the Army in both these countries is unable to do so, and is unprotected, both as regards equipment and *personnel*, to meet this certain danger of field service. There is no better field in the world than North-West India and neighbouring countries for demonstrating this fact. There is nothing more certain than Lord Roberts's prediction, always supposing the present toleration continues, that "we must be prepared for a much larger percentage of disease" even than in South Africa. The experience of the Afghan War, with a death rate of 80 per 1,000 from water-borne cholera, supported by all subsequent frontier operations, and the experience of all Indian manœuvres, leads practically to the axiom that the moment the Indian or South African Armies take the field, imperfectly educated, trained and equipped in sanitary methods, as they are, the rise in preventable disease will infalliby point to the coming disaster that will paralyse them as a fighting force.

To meet this, what were the arrangements of the Khyber Field Force? Not a single one of the essentials I have laid down was in force. The supply of boiled drinking water was in the hands of untrained natives, distributed in pakhals, and the soil around the camp was in a "generally polluted state." After the epidemic had claimed every sixth man in the force, arrangements were made to clean up the camp, discard the pakhals, placing the boiled drinking water in galvanised iron tanks. The report states that with the completion of these arrangements the epidemic came to an end.

To realise the danger to which the Army in India would be exposed on mobilisation, consider the arrangements four years later (1902) at the Delhi manœuvres. Wells found to be polluted and presumably in the enemy's hands, "were ordered to be cleaned out before the manœuvres." For the first five marches out of Umballa it was possible to examine a number of wells in advance of the troops. This was done, and the wells cleaned out by sappers and miners, portable pumps were fixed, and the water treated with permanganate of potash. Without stopping to enquire how a sapper or miner can "clean out" a well, so as to render it sterile, or what permanganate of potash could do in this direction, it is obvious that such proceedings, being impossible in war without the enemy's sanction, render the manœuvres from a sanitary point of view a mere farce. Unreliable and superfluous to an Army properly equipped to prevent disease, such measures only indicate an Army without sanitary organisation or confidence. Should it be the misfortune of this country, as Lord Roberts foreshadows, to place an Army of half-a-million men on this frontier under such organisation and methods, we should most certainly find it paralysed by disease. If, however, the Army can be induced by your efforts to carry out earnestly the details of a

scheme embracing the "essentials" I have stated, then it will have added to this mobilised force three army corps in strength, and a degree of efficiency and mobility otherwise impossible.

Organisation.—Sanitary organisation in an Army consists of four factors, using the terms in a general sense:—

1. Educational.
2. Recording and administrative.
3. Controlling.
4. Executive.

The "educational" and "recording" factors are obviously the function of a special Sanitary Medical Service, the "executive" factor is fulfilled by the actual sanitary sections, *i.e.*, the "water-section" and "pioneer section." These three factors were provided for in the "essential conditions" I placed before this Institution four years ago, and met with approval. A year later the Report of the Expert Commission on Enteric Fever in South Africa corroborated their importance. Recently, they were embraced in the organisation proposed by Colonel Firth, R.A.M.C., the distinguished Professor of Military Hygiene, so that I think I may say all authorities will agree that these factors must be provided for in the manner proposed. As regards, then, factors 1 and 2, as I am in accord with Colonel Firth, I will briefly outline his recent proposal.

A Sanitary Bureau, to be established as a section of the office of the Director General of the Medical Service. The Director of the Sanitary Bureau to be responsible for the whole sanitary effort and organisation of the Army. Under him are the Sanitary officers of commands, divisions or districts. Their reports of the incidence and causation of outbreaks of preventable disease would form the records for future action.

There remains to be considered factor 3, Control, and in this is comprised the question of responsibility. It is a factor of great importance, and concerning it there is some difference of opinion.

At the outset I may affirm that to obtain success three conditions are important:—

a. Control and responsibility should be vested in the same officer.

b. Control and responsibility should be associated in this officer with capacity to obtain the results required;

and further, as the control of these diseases cannot be assured "by orders" alone, but requires the interested and willing support of the whole Army, and those directly concerned in sanitation, the third condition follows,

c. That success be recognised by distinction in a suitable form to officers, sanitary sections, and units.

Now there are practically only two modes of carrying out the controlling factor in sanitation, and one or other of these will be adopted.

A. That proposed by Colonel Firth, R.A.M.C.

In this scheme the trained responsibility and control is vested in the Sanitary officers to commands, divisions, or districts, who would be directly responsible for all practical sanitary effort. They would

act as staff officers, issuing instructions "by order" of the officer commanding. In the case of smaller areas or units the various officers in medical charge would, as regards sanitation, be held responsible by the Sanitary Bureau. The sanitation of individual lines or barracks, would devolve upon the officers commanding the units in occupation. The disciplinary or corrective measures in the case of sanitary default to be the direct outcome of inspection and action on the part of the sanitary officer, acting "by order" of the local commanding officer.

The points for consideration in this scheme are:—

1. The officers of units actually controlling the work of "water sections" or "pioneer sections" in individual lines or barracks are not held responsible for the results following, and so the first condition is not fulfilled.
2. The same officers being deficient in the trained capacity to obtain the results required, the second condition is not fulfilled.
3. The condition of the recognition of success is not fulfilled, apparently, success being attributed not to the officer controlling, but to the sanitary officer inspecting, who is alone held responsible.

It would appear that unless the officers of units are trained in sanitary matters they cannot properly control the work of sanitary sections placed under their command, nor could they be held responsible. For this reason, presumably, Colonel Firth throws the onus of responsibility for defaults upon the sanitary officer, and he, in his anxiety to secure success, by frequent inspections, would apparently become the source of considerable friction both to the much-inspected sanitary sections and to the officers of units, under whose control these sanitary sections are placed. Moreover, in the case of defaults, the expected new "instructions," descending "by order" from above upon these latter officers, would hardly tend to make the sanitary officer's inspections welcomed, and this again would tend to lengthen the intervals of inspection, until the outbreak of disease from imperfect control and due to a default many days prior would call for a special sanitary inspection, when the evidences of default had long been covered up, and the sanitary officer upon whom the blame is to rest would be compelled to report favourably of those really in default.

B. The other mode of placing responsibility and control is that to which I have previously, and I now again, draw your attention. This scheme accepts the present system of control by officers of units or corps, but requires that the trained capacity to exercise this control is assured, and then centres the responsibility for results obtained in the same officers. It assumes that the success hoped for depends ultimately upon the careful work of the two sanitary sections, provided alike in both schemes. These sections, having received from the sanitary officers the training in methods to be followed, are then placed under the control of officers of units of which they form part. According to this scheme, the officers of these units have received instruction in the same methods, and are therefore fully competent to control these sanitary sections and to criticise their technique. The frequent inspection by highly-trained medical officers becomes unnecessary, and would introduce a dual control, diminished interest

and feeling of responsibility. Non-medical officers would require a short course of instruction at a school of sanitation, covering the same ground as the two sanitary sections, with a practical examination in inspecting a model set up of an Indian, or other, camp or barracks, into which one or other of the usual possible defects indicated by their "Handbook of Sanitation" had been introduced. It would presumably take an officer a fortnight or so, once in his lifetime, to be quite competent to control routine sanitation in a camp or barracks.

The officer of a unit having thus, and thus only, acquired the same capacity as a sanitary officer to obtain the results required, takes over the entire responsibility for the occurrence of these diseases, and the possibility of distinction, promotion, etc., which I have shown success must carry. Under this scheme the advice of the sanitary officer would be eagerly sought by every officer in order to secure success, and his visits of inspection would be welcomed rather than the reverse. In the case of the outbreak of disease, and a consequent sanitary inspection, every effort would be made rapidly to discover and remedy the defect, rather than to conceal it. The result of these inspections would be reported directly and confidentially to the Sanitary Bureau by the Sanitary officer, credit or otherwise being referred to the officers concerned; the recommendations for distinction being made by the Director of the Sanitary Bureau and given effect to by the Army Council at fixed times; an immediate report dealing with the causation of the outbreak and its remedy being handed at the time to the officer commanding.

It will be seen that control, responsibility, and trained capacity are, in this scheme, all combined in the same officer, and that great weight is attached to stimulating the active intelligent interest of all concerned by the assurance that success following earnest effort will bring distinction on the individual, the unit on the corps.

That non-medical officers are highly capable of carrying out these controlling duties effectively and with distinction is demonstrated by numerous reports of the Royal Army Medical Corps, and is supported by the report of the Commission on Enteric for South Africa, which states:—

> "There are many exceptions in which keen and brilliant soldiering has been associated with particular attention to sanitation, with the result that the regiments fortunate to possess these officers have enjoyed good health, and hence had the largest available force."

That there is nothing difficult in the practice to be followed is evident, the difficulty only being to assure continuity of application of the details.

I have placed the two schemes, on this particular point, side by side for your consideration, as one or other must certainly be adopted without further delay, and it would seem that to ensure effective and smooth working they deserve serious consideration. If you concur in the latter view, that the officer commanding a unit is the proper person to control sanitation in that unit, then I think you will agree that we are justified in requiring that a "School of Sanitation for Officers" is established forthwith, that a "Handbook of Sanitation" for the field and the barracks is provided for officers, that all officers are instructed in the simple, orderly, and effective detail of technique to be followed to protect the avenues by which the real destruc-

tive agent in war—the bacilli—approach their men, in order that they may be competent to undertake with confidence the "grave responsibility" placed upon them by paragraph 669A of the King's Regulations, referring to "the preservation of the health of the troops," which at present must remain to them a dead letter.

In placing these proposals for consideration before the members of this distinguished Institution, I am, as a layman on one side of this question, conscious of numerous shortcomings, which the actual experience of war and of Army organisation of many of those present will doubtless be able to correct and illuminate. Conscious, as I am, of the full ability of the Army generally, if properly directed, to attain the object desired, and of the capacity of the Royal Army Medical Corps to grapple with this problem, I am at a loss to explain the condition in which I have shown the Army to be—sanitarily immobile, sanitarily unequipped for the field, sanitarily untrained and unprotected in an effective sense, both in peace and in war.

Lieut.-Colonel W. HILL-CLIMO, M.B. :—As the oldest medical officer in the room, and with no little experience of enteric fever in peace time, I desire to make a few remarks upon this very interesting lecture. With much that Dr. Leigh Canney has said I agree, though I dissent from some of his conclusions. The subject in its entirety is unfortunately too vast for discussion in the limit of time at my disposal. But it will not be out of place, by way of showing that I approach the subject after mature study, for me to say that between the years 1889 and 1893 I officially reported to the military and medical authorities in India the failure of the trench system of conservancy, the sub-soil pollution of cantonments, and the consequent contamination of the water supply with the germs of enteric fever. I also showed how the food supplies were similarly poisoned by dust and flies. I agree, therefore, with Dr. Leigh Canney that water is the most frequent avenue for the ingress of the disease into the human being. Yet in doing so I do not for one moment wish to minimise the importance of the other avenues of admission in standing camps and in armies in the field during war. To do anything to induce such a belief in our Army will have the most disastrous effects on its health efficiency during war, for it must be remembered that "dirt breeds disease," and that the person of the soldier, as well as his environment, equally requires sanitary attention. The internal causes of disease in an Army, as well as the external, require the most careful attention. If these causes be considered so far as our Army is concerned, it may be safely laid down as an axiom that we can despatch no Army from our shores in time of war without its taking with it, and breeding in itself, the germs of enteric fever, for these germs are never absent in an Army raised and trained as our Army is. To illustrate the difficulty there is in tracing the avenues of admission of enteric fever, and of the development epidemics, I give the following instance, which is one of my Indian experiences. In most cantonments it was the custom for each regiment to have a wooden block placed in the open near the ration store-room for chopping the meat ration before distribution to the companies' orderlies and removal by the kitchen cooks; every cantonment swarms with pariah dogs, or at least they did in those days, and by them these blocks were not infrequently licked. In investigating the causes of a particular epidemic of enteric fever I learnt that pariah dogs in the cantonment were dying in large numbers from fever accompanied with

diarrhœa. A very able medical officer at my request made a series of *post-mortems*, and found that the lesions were those of ulceration of the bowels analogous to those of enteric fever. This happened long before the discovery of the typhoid bacillus, but that discovery has confirmed the opinion which was then formed. I mention these facts to show that in the present state of our knowledge of the etiology of enteric fever, the last thing a sanitary expert should do is to dogmatise; a pure water supply in peace time will go a long way to protect communities from the ravages of enteric fever, but alone, in war, it will not protect an Army from epidemics of enteric fever and from dysentery. Time does not admit to go into details. I therefore propose to consider the lecturer's four main proposals. These are:—1. The creation of a "water section" for the supply of pure water in camps and in the field. 2. The execution and discharge of sanitary work in camps and units by non-medical officers, who would be held responsible for the incidence of enteric fever, dysentery, and cholera in their units. 3. The employment of expert sanitary officers, their functions being educational in peace, and advisory and recording in war, the sanitary officers of the R.A.M.C. only visiting camps or units in one of two capacities: *a*. Advisory, at the request of the officer of the camp or unit; and *b*. Critical and peremptory, for purposes of enquiry at the request of the Sanitary Department of the R.A.M.C., and by order of the officer superior to those of the units affected. 4. The creation of a pioneer section trained in the methods of camp sanitation. For the preservation of the health of an Army in the field, a pure water supply and the effective sanitation of camps and units by its sanitary service, whatever that sanitary service in the future may be, are indispensable. Consequently this service must be trained in the technique of water sterilisation, etc., and in methods of camp sanitation. So far, therefore, there will be general agreement; but when the organisation of this sanitary service, and the work which it will have to do with troops in the first line on the field—that is, with troops constantly on the move—are considered, then the officers of the R.A.M.C. and of the Army generally will, I think, part company with Dr. Leigh Canney's scheme. Time will not permit the consideration of details, upon which different opinions are held, but doubtless they will be dealt with by others. I am only concerned with the general principles which are involved in selecting the agency by which sanitary work in the Army should be done. Dr. Leigh Canney fixes the responsibility and gives the control to non-medical officers. In my opinion, this responsibility cannot be enforced, or at least ought not to be enforced, upon any individual, who, by education and training, has not the necessary knowledge. Efficient control over sanitary affairs requires medical knowledge; conception and execution must be concurrent. The sanitary service must be trained by the R.A.M.C., and must be a branch of the Army Medical Service. It is not sufficient for the man who knows to criticise; it is for him and no other to act. Upon the way this work is done by the medical service it must stand or fall. As Dr. Leigh Canney gives Colonel Firth's alternative scheme, which is to all intents and purposes the same as I have for the past twenty years advocated, both in official reports, in the *United Service Magazine*, and in the *Journal of the Association of Military Surgeons of the United States*, it may seem superfluous to offer these observations; but if medical opinion be not united, it will cause delay in the solution of perhaps what is the most important question which affects the military efficiency of the Army in war at the present time. Personally,

I am glad that Dr. Leigh Canney's lecture has given the opportunity of calling attention to what I believe to be the most important duty which should devolve upon the R.A.M.C., and for which he deserves our thanks.

Surgeon-General Sir ANNESLEY DE RENZY, K.C.B. :—There are many points in the able paper just read that I have not been quite able to follow, but there are several points with which I have been familiar for many years upon which I venture to offer some remarks. I would take as a text for my remarks, in the first instance, an extract from the letter published by the Principal Medical Officer of the Army in India at the present time, Surgeon-General Gallwey, who, in a long letter occupying two columns of the *Times*, says :—"But, do what we can, I am afraid we can never abolish enteric, which Dr. Canney claims can be done by his Royal Water Corps." That is a very discouraging statement, and as a practical comment upon it I would like to give you a piece of my experience, which, I think, is really very complete. Since my retirement from the Service, twenty-three years ago, I have been a director of three important industrial companies in Assam. These companies employ collectively something like eighteen to nineteen thousand coolies. With these I am not concerned, owing to the extreme difficulty of getting thoroughly accurate and reliable information as to the diseases from which they suffer; but these companies employ about eighty Europeans, sometimes more and sometimes less, but on an average of twenty years the number cannot be less than eighty. These men embrace men of the Army age, that is, men ranging in age from twenty to forty-five or forty-eight years of age. I receive monthly medical reports on the health of the whole of the establishments of these companies, the natives as well as the Europeans. During the whole of my service in India I was very much interested in the question of cholera and enteric, and I have watched with the keenest interest the reports that I received on the health of the Europeans attached to these companies. The information that I have to give you now is, that not one single death from enteric has occurred in that body in twenty-three years. Assam, I need not tell you, is by no means a paradise of health, and enteric is not unknown there. Our coolies, I am sorry to say, are greatly afflicted with cholera; we have heavy losses among them every year from cholera, but not a single European on our staff has suffered from either cholera or enteric. What is the explanation of that? These men have nearly all passed through my hands. I examine them before they go out. They are all intelligent men. They are told when going out to join these industrial companies, who must live from the profits they make from their industry, that if their health fails they are done for; the companies cannot keep them on as invalids, and I impress upon them most earnestly that the most effective means of protecting their health in Assam is to be strictly careful of the water they use. They have taken my advice; many of them have provided themselves with Berkefeld filters; most of them, I believe, now use boiled water, and the result has been, as I have said, that for over twenty years there has not been a single death or even a case of enteric fever or cholera among them. I may say that the reports I receive of the health of the establishments I have mentioned are furnished by qualified British medical men. I think this case is most significant and encouraging, and I feel perfectly confident, from my knowledge of the British troops and the conditions under which they live, that the rate of mortality can be much reduced. Let me

give you an example of what has been done already. In the ten years following the Mutiny, the death-rate at Fort William was 110 per thousand, cholera, enteric, and dysentery being the prevailing diseases. At that time the water supply of the fort was most defective. There were several kinds of water used. Much of it was taken out of the ditch and some from a gathering ground outside, which was not secure from the countless sources of contamination that exist in the neighbourhood of a great Indian city. The Government were naturally stunned by this great mortality, and the question of providing the fort with a proper water supply was taken into consideration. In the year 1870 the fort was provided with water from the municipal works in Calcutta. I do not know of any other great change that was made. If you walked through the fort it was at all times clean to the eye; but what was the result of the change made in 1870? The result was, that now, for a period of over thirty years, the average death-rate of the men in Fort William has fallen from 110 to a little over 10 per thousand!! I will not occupy more of your time, but, supported by my experience of Assam, and knowing that enteric fever has been very nearly abolished in Fort William, I believe there is very good reason for hoping that it may be far more effectually dealt with than it is at present in the fine climate of the North-West Provinces and the Himalayan stations.

Major T. McCulloch, M.B., R.A.M.C. (Deputy Assistant Director-General):—The great importance of the prevention of disease on field service is a matter regarding which there can be but one opinion, and it is because of this importance that it behoves us to carefully sift our evidence, so that we may be able to separate established facts from mere arguments, which, however attractive they may be in theory, may probably fail us when applied practically. I think most men will agree that the most reliable counsel as to the measures which should be adopted for preventing a disease is likely to be that obtained from those who have had large practical experience of it. In all the papers which Dr. Canney has written up to the present, we can find evidence of a large acquaintance with the literature of enteric fever, but little or no evidence of practical acquaintance with outbreaks of the disease. If Dr. Canney would only give us details of the outbreaks of enteric fever with which he has had to deal, and facts as to the results obtained from the preventive measures he adopted, he would very much strengthen his position, and his arguments would come with greater force. I do not mean for a moment to imply that his arguments are unsound, although I do think that certain of his claims are not likely to be realised in practice. For example, he claims that with the application of certain preventive measures there would be "total immunity from water-borne disease" and "enormous reduction of transport," and the only basis for these claims rests on theoretical probabilities. The prevention of enteric fever is by no means the simple matter that claims such as these would seem to indicate. It is one of the most difficult problems in preventive medicine. When people talk of abolishing the disease in Armies in the field, they seem to forget that its abolition from endemic areas in England itself is by no means complete, and that satisfactory results have only been obtained by years of extensive drainage and sewage disposal works, and water supply schemes, such as are impossible during military operations. With regard to preventability, one of the greatest of English sanitarians, Professor Parkes, in reviewing the progress of hygiene in the Army Medical Department Report for 1860, states in reference to Dr. Wm. Budd's

views, which were being published at the time:—"We can only here remark that whatever view be taken (whether the specific poison increases only in the body or in the sewage air), the grand fact is clear that the occurrence of typhoid fever points unequivocally to the defective removal of excreta, and that it is a disease altogether and easily preventable. Typhoid fever ought soon to disappear from every return of disease." Unfortunately, the expectation expressed in this quotation has not been realised. Just forty years later, at the annual meeting of the British Medical Association held in 1901, we find that Dr. A. C. Houston, in opening a discussion on "Enteric Fever in its Public Health Aspects" begins with these remarks:—"Notwithstanding the progress of science and the great efficiency of the public health service, we find ourselves at the beginning of a new century unable to stamp out a disease which is nevertheless still classed as a preventable one. All we can say is, that at the present time the mortality from it is less than it was some years ago." Further, everyone who has a practical knowledge of the epidemiology of the disease knows that it is almost always difficult, and often impossible, to trace the source of the specific poison even when the disease assumes epidemic form, a difficulty which is not lessened by the fact, now almost universally accepted, that a polluted water supply is far from being the only means by which the poison gains access to the body. It follows, therefore, that the application of the attribute "preventable" to enteric fever must be made in a very guarded sense. Dr. Canney states that enteric fever is a preventable disease in Armies as in civil communities—but surely enteric fever is still observed in civil communities, and even large outbreaks are not uncommon. Water is, no doubt, often a carrier of the enteric poison, but if the bacilli are almost exclusively water-borne germs, then one would have expected much greater success than has occurred, in the reduction of enteric prevalence, from the measures taken in India which have proved so efficient in controlling cholera. In the present state of our knowledge regarding the origin and mode of spread of the disease, I fear that it would be outside the limits of fairness to punish a man for contracting enteric fever, or an officer who is unfortunate enough to get an outbreak in his unit. But when breaches of sanitary rules occur, then I see no reason why the punishment should not be made to fit the crime. In the statement relating to the loss suffered by the force in India and South Africa in 1903, the statistics of the final disposal of men invalided has been erroneously included; thus the loss to the two countries, comprising only deaths in the country and invalids sent to England amounts to 4,327, or 4·5 per cent. nearly. If we take into consideration the total loss to the Army occasioned by service in the two countries we find that the percentage is further reduced to 3 per cent., instead of rather more than 6 per cent., as stated by Dr. Canney; and the 3 per cent. embraces loss from all causes, the loss from enteric fever being just under ·5 per cent. It would appear to be a very general impression that boiling the water is a new preventive measure, whereas it is a measure that has been in use in the Army for years past. Within my own knowledge it was practised as a preventive measure eighteen years ago, in an enteric outbreak in Mauritius. It has been in almost universal use in India since 1896. Since the war, the troops at all stations in South Africa have been supplied with boiled water, and in one station there is a piped distribution of the sterilised water. The legation guard at Pekin has distilling apparatus in use. Formerly, it was almost the universal opinion that polluted water was the only agent concerned in the con-

veyance of the disease; but of late years opinion has considerably changed, and it is now almost as fully recognised that an exclusively water-borne theory will not explain the facts connected with the occurrence of many outbreaks, and the many puzzling points relating to the endemicity of the disease in certain areas. Flies, dust, infected bedding and clothing, and person to person infection are now acknowledged to be potent factors in the dissemination of the disease poison, and have to be reckoned with as well as water-borne infection. In the Army the aim of our preventive measures is to shut off every possible, or even probable, source of infection. In short, we aim at providing the soldier with pure soil, pure air, pure water, and pure food, at giving him healthy quarters to live in, and at taking care that their neighbourhood is also kept in a satisfactory sanitary state. Sanitary officers have been appointed to commands at home and abroad. Part of the duty of these sanitary officers is to educate the officers and the rank and file, in the elements of sanitation and the measures for the prevention of disease. Courses of lectures on the same subjects are given to the cadets at Sandhurst and Woolwich. The School of Sanitation is by no means new, although from the wording of Dr. Canney's paper one would gather that it was he who originated the idea, whereas the proposal originated in the War Office. As regards sanitary immobility, Dr. Canney has forgotten to mention that I myself showed him at Millbank Barracks all the known methods of water sterilisation, from which he might have inferred that the subject was not being neglected. Amongst other means, he saw a water-cart fitted with sterilising filters, capable of providing 200 gallons of sterile water per hour. This cart has been since tried at the Aldershot manœuvres, and has proved the most satisfactory means of providing sterilised water for troops in the field that has yet been devised, and every form of apparatus that has been proposed for this purpose has been most carefully considered, and every known means of rendering water safe has been gone carefully into. Details of the work being done in this direction at the War Office I am unable to give for official reasons. I can, of course, only speak as a private individual, but I can give the assurance that the responsible authorities are by no means taking up the position that as enteric fever is difficult to prevent, it therefore must be tolerated.

T. Miller Maguire, LL.D. (Barrister-at-Law, Inner Temple):—I should like to speak merely as a member of the community at large and not as an expert. This lecture appears to me to be one of the most depressing things I have ever listened to, and we have not been very much relieved with regard to the future by the debate, so far as it has gone. Manifestly the gentleman who has just sat down is rather well pleased with the state of things which we ordinary people deplore and reprobate exceedingly. His speech was rather optimistic, and a kind of attack on Dr. Canney for venturing to be enthusiastic and throwing his heart and soul into trying to induce us taxpayers to get some value for our money in the shape of an efficient Army. Surely every case of preventable sickness in an Army is to be deplored, and prevention is better than cure, especially in the moving cities called armies. But what harm has Dr. Canney done? Supposing men like Dr. Canney had been listened to several years ago, much might have been done. I listened several years ago to a speech made by Dr. Canney here. Civil enthusiasts like Sir Conan Doyle were present, and at that time Sir Conan Doyle and other speakers like myself asked this plain question: "Can this epidemic or plague,

so disastrous to our Army, be diminished to such an extent that even 500 or 600 fewer men die annually?" The answer was: "Yes." "Then why is it not done?" was our next question. Suppose it cost £10,000 or £500,000, and that the result of spending the £500,000 was to render our Army more efficient, and prevent decay and disease and those long-drawn columns of misery and death depicted on the wall—and all the loss by way of attendance. Suppose that the deaths were only 100 fewer, I say that £50,000 or £200,000 would be well spent. Dr. Canney proposed years ago to increase our military efficiency in a campaign 8 per cent., and thus save millions of money and thousands of lives. We are perishing as a nation through hide-bound officialdom. In war, wise expense is true economy, and if it prevents enteric fever it is brilliant economy. Therefore, Sir, instead of nagging at men like Dr. Canney, let us support them and admire them, and insist on their views being immediately taken into consideration and put into effect. I will do so myself, in spite of ten War Offices, at the hustings during the next election. Nothing can be more wasteful and extravagant than official complacency. We spent £46,000,000 in 1904, and yet we had no Army, no military education, no medical foresight, no guns; we had soldiers that could go nowhere and do nothing—even in Essex. For this enormous expenditure we could not get even water-boiling kettles or hygienic lectures. Lord Roberts says our Army is no better than it was in 1899. I say it is worse—absolutely and relatively—than it was in 1704 or 1808. We have no medical officers; we have nothing—except an Army Council. We would have a very much better Army if Dr. Canney's views were taken into consideration as soon as possible. I thank Dr. Canney most heartily for urging on the members of this Institution to take every step in their power as soon as possible vigorously to support him, so that we may do something at all events to diminish disease, waste, and death. I will not detain you for long, but I should like to read out two or three figures. I lost 181 friends dead in South Africa, and am violently in earnest. Please listen to these figures, and then thank Dr. Canney. I quote from Munson's "Military Hygiene":—

COMPARATIVE LOSSES (DEATHS ONLY) FROM DISEASE AND CASUALTIES.

	Disease.	Casualties.
Walcheren Expedition, 1809. British ..	21	1
British Army in Spain. British	3 (more than twice the number of men in the army passed through the hospitals during the year).	1
Russo-Turkish War, 1828	4	1
General Scott's Campaign in Mexico. U.S. ..	Losses from disease alone exceeded one-third of the effective forces.	
Crimea—Allies (in 6 months)	25	1
French (whole War)	3·75	1
French War in Mexico. French	nearly 3	1
American Civil War—Federals	about 2 (excluding 24,184 deaths, cause unknown).	1
Confederates	3	1

	Disease.	Casualties.
Austro-Prussian War, 1866. . . . . Prussians	$1\frac{1}{2}$ (very short campaign).	1
Spanish-American War, 1898. . . . Americans	$7\frac{1}{2}$ (very short war, unhealthy country).	1
South African War. Out of action. . . . British	3 (long war).	1
Franco-German War, 1870-71. . . . Germans	0·57	about 1

Russo-Japanese War (*Oku's Army*)—

	(Cases of disease.)	(Killed and wounded.)
May 6th to December 19th ($9\frac{1}{2}$ months) . .	about 1 (40 deaths only from disease).	1

No wonder soldiers like to serve with Oku and similar chiefs, and shirk enlisting under the direction of sophists, dialecticians, rhetoricians, and fever cultivators. Here is a quotation from the *Times*, but as my time is up, I cannot read it all, but I must, as a citizen interested in our soldiers, quote part of it:—"An immense amount of time and money was wasted in utterly futile and unnecessary so-called experiments to determine questions which Dr. Canney's experience would have enabled him to answer in five minutes. Fortunately there has been no war; but even in time of peace we lose large numbers of men every year from enteric, and this loss has been suffered to proceed unchecked. The Advisory Board made certain recommendations which were never carried into effect, and which appear, from the reply given in the House of Commons on the 10th inst., and quoted by Dr. Canney in his letter, to have remained unknown to Mr. Arnold-Forster, who said that nothing so 'sweeping' had been advised. Politicians do not often appreciate at its full importance the fact that proposals based upon science are always 'sweeping.' Natural phenomena cannot be made the subjects of political compromise, and natural laws must be obeyed in their entirety, or those who break them must pay the penalties of disobedience. In the meantime, and while English officialdom has been talking and doing little else, Japan has applied Dr. Canney's suggestions with complete success, and, for the first time in recorded history, has maintained enormous armies in the field without sustaining appreciable losses from enteric. According to the reports which have reached this country, the medical officers of the Japanese Army precede the men into all new quarters, analyse the soil and the water, and cause guards to be placed over every source of food or drink that is in the least open to suspicion." Now then, am I not right to advise my audience to hearken to our worthy lecturer with all their ears and hearts? Seek knowledge, worship Minerva, don't be too proud to drink boiled water; compel Pall Mall to shake off its apathy as to this most important matter of life and death, and join me in heartily supporting our lecturer for his most valuable contribution to the vital interests of our nation. I saw the last speaker shaking his head when I said that the Japanese could deal efficiently with the prevention of enteric. Is it because he does not believe my statement?

Major T. McCULLOCH:—Yes.

T. Miller Maguire:—They are put forth on very good authority. It is not for me to waste any more of your time, so I sit down by saying that I heartily thank Dr. Canney for his admirable lecture.

Professor W. J. Simpson (Professor of Hygiene, King's College, London):—I am entirely in agreement with Dr. Leigh Canney in the views he has so clearly propounded, and I think that he deserves great credit for the pertinacity with which he has advocated the cause of sanitary reform in the Army. His views are bound to succeed in time, and the sooner this occurs the better it will be for the Army in particular and the country in general. As a member of the Commission sent out to enquire into the prevalence of dysentery and enteric fever in the Armies in South Africa, I was specially impressed by two things: one was the bravery and courtesy of the soldier, and the other was the very great loss to the Army of this splendid material brought about by the prevalence of preventable diseases. In two years over 31,000 cases of enteric fever and over 24,000 cases of dysentery were admitted to hospital; in other words, 55,000 men, or more than one army corps and a half were attacked with preventable diseases. The causes were patent enough everywhere; but the most patent of all was that which Dr. Leigh Canney has laid such stress upon, viz.: the supply of polluted drinking water to the soldier. Purification of water for the troops was the exception. It could not well be otherwise, for there was no specially trained organisation with apparatus and appliances whose duty it was under all circumstances to supply pure water to the soldier. There are some who contend that it was not the polluted drinking water that produced the bulk of the enteric fever and dysentery, but that it was the insanitary camps, associated with dust and flies. Although I am unable to agree with this view, yet it is well to point out that the conditions mentioned were due to the same cause, viz.: the absence of any efficiently organised sanitary service in the Army. There were admirable sanitary regulations in existence about water supply, sanitation of camps, and hygiene generally, but these were of little use because there was no regular service whose special business it was to do nothing else but carry out these regulations. This defect in a properly constituted sanitary service was not the fault of the medical department, who were well organised from the medical and surgical aspects of war, and whose time was more than fully occupied in attending to the sick and wounded; but the fault lay in an unfortunate misconception on the part of Lord Wolseley as to the unimportance of hygiene in war, and who, by his opposition to the development of a special sanitary service in the Army, succeeded in practically stifling it at a very early age. The result was that no sanitary organisation worthy of the name existed for the prevention of those diseases to which an Army in the field is peculiarly exposed. Many medical men did their best individually to keep the troops under their charge in good health, but individual effort was liable to failure when the conditions were such that they could only be dealt with by a thoroughly trained and organised service. If there had been a specially trained service to supply the troops with pure water, just as there was a special commissariat service to supply them with food, or a service of Royal Engineers to supply them with bridges, roads, and boats; if there had also been a branch of this service whose business it was to devote itself to the sanitation of the camps and the prevention of the spread of epidemic diseases, there would not have been the immense amount of needless suffering among the troops, and the general in command would

have probably had at his disposal more than an army corps of additional men, instead of having over 55,000 lying ill in hospital. My views as to organisation are expressed in the report of the Commission. They are: That the regiment or unit shall have its water section and pioneer section and camp quartermaster thoroughly trained, and that the regimental medical officer shall be technical adviser to the commanding officer. I agree with Dr. Leigh Canney, that the commanding officer shall be responsible. It would remove a good deal of friction. Beyond this unit, however, I recognise that there must be a separate sanitary service for administration and control of health matters, and I think this would best be formed by the special officers of the R.A.M.C., who may be appointed to this service, having associated with them a few sanitary engineers. There are sanitary questions in standing camps, and even in temporary camps, where large bodies of troops may be encamped for several weeks, as happened on the Modder River, where the services of a sanitary engineer would be invaluable to the chief sanitary officer. A sanitary service composed only of medical experts is likely to come to grief by undertaking too much responsibility without the means of carrying out promptly the work which may be required. I am also in favour of a Sanitary Bureau at the War Office in London, which shall consist of a scientific branch, a general health administrative branch, and a sanitary equipment branch. By the united labours of the Director-General, his Staff, and the civil members of the Advisory Board, a vast improvement has been effected in the R.A.M.C., on its medical and surgical sides; but the progress made in sanitary reform and organisation, and in the formation of a special and distinct sanitary service that cannot be detached for other duties has been, as pointed out by Dr. Leigh Canney, far from being satisfactory. The importance of sanitation in the Army has not yet been recognised as a bigger and greater thing than even the medical or surgical side of the R.A.M.C. This was only to have been expected from the constitution of the Advisory Board. There are no sanitary experts on that Board outside the military member, and until this fundamental defect is remedied, the ideals which Dr. Leigh Canney advocates can only have a very imperfect realisation, and yet those ideals are for the most part practical, and are of the highest importance to the welfare of the British Army.

Dr. W. Page May, M.D., D.Sc.:—Many of my remarks have been already anticipated, and therefore I shall not detain you long. I have listened with very great interest and profit to Dr. Canney's admirable paper. It seems to me that he has devoted a great deal of time and money to the study of this very important question. He has no axe to grind, and therefore I all the more admire the work he has done. I have seen a good deal of typhoid work in London fever hospitals and other hospitals; also in Egypt, and to some extent in South Africa, and I am entirely at one with him in his main contention that the chief factor in the spread of disease is a liquid one. Of course, there are other means by which the disease is spread, but that is the main channel in my opinion; and there are thousands of physicians in this country, in the United States, and in the civilised countries of the world who are entirely in agreement with that opinion. I have seen a good deal of the R.A.M.C. work, and I am sure Dr. Canney will be the first to admit the enormous and almost insuperable difficulties with which the Royal Army Medical Corps have constantly, every day, day and night, to contend with. But in staring at the blue diagram exhibited, one stands aghast,

because that is not merely a record of the past; it tells us what is going on to-day, and what will go on to-morrow. At present thousands of valuable lives are being lost, and there is no doubt that, with improved methods, that enormous death-rate could be diminished. I will not detain you any longer. Dr. Canney has suggested various methods for the application of his main contention, that typhoid fever is spread rather by means of water that is drunk, water that is added to fruit or salads, or ice, or butter, or whatever it may be, but anyhow, by means of liquid channels. Although his methods may be very good, I am absolutely incompetent to give any information on the point; but I feel that, as a citizen—as we are all citizens of this great Empire—it is a point that should be investigated, and investigated at once, and that its application should be immediately made.

Major C. E. DANCE, M.R.S.I., Adjt. 1st Lond. R.E. (V.), late Surveyor Metropoltan Fever Hospitals, etc. :—Having attended Dr. Canney's admirable lecture in November, 1901, and again on 8th November, 1905, at the R.U.S.I., I am venturing to submit a few brief remarks upon the main points of his proposed scheme for preventing the waste of life in the Army under the heading "Enteric." I have been prompted to make this venture by others, who, although not medical officers, have assisted in helping to stamp out this disease under varying conditions and they have urged me to give my views as an engineer of some years' experience in sanitation and the construction and maintenance of temporary and permanent infectious hospitals in the public service; consequently, I must crave due indulgence at the hands of medical officers. From Dr. Canney's paper and his references to the late Secretary of State for War's statements in the House, it appears evident that the Authorities (in spite of our bitter experiences in South Africa) have failed to grasp the real solution of this awful trouble in the Army, as we find on his authority that in August, 1905, the Advisory Board had not made "such a sweeping recommendation" as outlined in Dr. Canney's scheme, but that "sterilisation experiments" were "still" going on (3½ years after Dr. Canney's lecture). Imagine what would happen if an engineer to a Public Board (Town Council or Civil Hospital, etc.) failed to submit a "definite system" for sterilisation of fluids within one month of receiving his instructions to do so. Dr. Canney kindly suggests that the "experiments" might reasonably be completed in two months, and I fully agree with him on that point. Lord Roberts's remarks on July 10th, 1905, in the House of Lords, also show that we are quite as unprepared now as in 1899-1900, and upon the same high authority "the abnormal number of sick on arrival at Bloemfontein was due no doubt not only to the exhaustive march," but to the terribly insanitary "conditions of our camp" at Paardeberg, and he also makes strong reference to the only "available" drinking water being the river which flowed down from the Boer camp higher up. Is anything stronger required to convince any man of average intelligence that the *whole evil* is due to a *proper and permanent Corps* of water supply and sanitation not being maintained as in other Services abroad (the Japanese, for instance, who have had practically no deaths in the hospital returns from enteric, etc., yet the Russians all around them were decimated with infectious complaints)? Assuredly, if we should again be plunged into a big campaign and the same death rolls of "enteric" appear in the papers, the Authorities will have a hard task to explain

away their apathy. The British public are now expecting military matters to be put on a sound basis; and as the present Cabinet and the House mainly consist of clear-headed business men, there is now a grand opportunity for the new Secretary of State for War to use his splendid abilities in this direction, as it is generally believed by all who have "successfully" fought this disease (including some R.A.M.C. officers), that the lecturer's scheme, with some slight modifications, is the *only way* of preventing further troubles in the future wars and in camps of peace operations. Dr. Canney's statement concerning the clean health bill at the Assouan Barrage Civil Camp is a striking proof of what *can be done* by means of proper sanitation, as it must be remembered that there we have a large population of natives mixed with white men and I need hardly refer to the habits of the former, however carefully one may try to obviate the evils of overcrowding in camps. Turning now to the constitution of the proposed "Water Supply and Sanitation Corps" (this is my name for Dr. Canney's admirably devised units), I would beg to refer to the instances in South Africa or the Naval Brigade and the Liverpool Regiment having devised a system of sterilisation of water which rendered those units practically free of enteric or dysentery.[1] At Standerton (South Africa) in 1903, it was admitted by all in authority that the marvellous freedom of that garrison from enteric was due to the perfect system there of *sterilisation and protection of the water for drinking*. These facts appear, to my mind, to show that the "Water Supply and Sanitation Corps" could be an independent unit from the R.A.M.C., if properly organised. Sanitation (and the various appliances, tools and "trades" appertaining thereto) is not the medical officer's province, although he is a very necessary individual in devising some of the best means of dealing with insanitation in "consultation with the sanitary engineers." In civil camps and hospitals I have always found the medical officers fully agreed in leaving such matters as sterilising appliances, water supply, drainage, etc., "in the hands of the engineer" and his "mechanics" and I have often been appealed to by the medical staff in civil institutions upon matters which the doctors have frankly admitted should never have been included in their spheres of duties. These happy little discussions have added greatly to the mutual esteem with which the medical and engineer staffs now regard each other and have resulted in many valuable improvements in sanitary science. I have seen much of the R.A.M.C. and they already have more than enough to do, therefore, to place their officers in charge of the Water Supply and Sanitation Corps, would, to my mind, be a *grave error*. I fully agree with Dr. Canney that all regimental pioneers should be obliged to qualify in sanitation (in fact, I urged this in 1901) and the simple methods of sterilising fluids — including excreta — as the latter method upon the first appearance of infectious complaints is now admitted a wise proceeding (particularly also in cholera and plague camps); the regimental pioneer should be to the medical officer what the Sanitary

[1] I have since heard that in addition to the system of sterilisation devised by the Naval Brigade and the Liverpools, their officers quite devoted themselves to the "rudiments of sanitation," and that they used their knowledge in a "practical way," having regard to the warm support which officers always obtain from their men when they have a "proper control" over them, hence the result.—C.E.D.

Inspector is to the Borough Council's Medical Officer of Health. The various regulations to be enforced in camps and on the line of march, concerning sanitation and water supply, should be drawn up by the officers of the Water Supply and Sanitary Corps in consultation with the R.A.M.C. officers, and the former should be responsible for the due attention to those orders by all branches of the Service once they have been approved. Regarding other avenues of enteric, I will merely refer to the (to my mind) convincing report of Dr. George Turner, Medical Officer of Health for the Transvaal, who was, I understand, specially engaged by Lord Roberts in the sanitary organisation of military camps there. This officer stated that "he had never any reason to suppose that enteric was attributable to 'either dust or flies,' *but that emphatically in South Africa it is almost entirely due to 'polluted water.'*" Again, the Expert Commission on Enteric in South Africa reported that the most conspicuous sanitary defect *almost everywhere* has been the impurity of the drinking water. These two reports are, in my opinion, absolutely convincing that we have only to deal with the water question and the cleanliness of the camps in the manner suggested by Dr. Canney. Apart from the method proposed by him, I would beg to urge that some very stringent clauses must be added to the King's Regulations, so that for breach of any permanent rules drawn up regarding water supply or sanitation "when on active service" prisoners may be summarily dealt with by the O.C. the man's unit; to put a man under arrest merely is no object lesson to men probably rushing forward to commit similar breaches of rules. Where a man's act is liable to cause enteric and death to his comrades, I maintain that the most humane act (in the long run) would be then and there to "prevent the consequences of his act being possible." I hope my meaning will be clear to those who have seen men behave like madmen under certain circumstances in the field. The marvellous diminution of enteric in "civil works camps," in Egypt particularly and other hot stations, is due, in the opinion of nearly all civil medical officers, to the improved system of sanitation and water supply devised by the various engineers in charge of the works after consultation with the medical officers, and I believe that if such a corps as outlined by Dr. Canney is brought into being, and adequate pay and encouragement offered to induce officers and men of special sanitary engineering experience to join same, the health of the Army under any conditions of service would be assured; but this could only be if officers of every other branch cordially co-operated with this Sanitary Corps to enforce the regulations for maintaining the health of their men and I think that Regimental officers might receive some tangible recognition according to the yearly hospital return of their units, so as to encourage such good work. In conclusion, I may add that at one period of my service there were over 800 men employed under me in infectious hospitals, and I believe as the result of sterilising all drinks and similar precautions to those advocated by Dr. Canney, only six of those men during 12 months contracted fever. This period was before I had the pleasure of meeting Dr. Canney in the lecture hall, so that I trust my views upon his lecture will be accepted as absolutely unbiassed. In case my remarks may come before any of the medical officers with whom I have had the pleasure of associating in the past, I should like to say that it is largely owing to their kindly and practical assistance and the valuable information given me by them on many occasions, that I have become possessed of sufficient knowledge to justify me in offering an opinion upon this particular subject.

Dr. LEIGH CANNEY, in reply said :--With so many present, distinguished for the part they have taken in promoting the welfare, and especially the sanitation, of the Army, I must regret that the length of my paper has seriously curtailed the time possible for discussion. I had hoped we should have a free discussion on the important point of control and the probable working of the two methods of control to which I have drawn your attention. Under both methods, that proposed by Colonel Firth, R.A.M.C., with the responsibility upon the sanitary officer and the control partly in the hands of the officers commanding units or corps, and that I have proposed, in which the entire control and responsibility are combined in the officer commanding, under both these schemes this officer is trained in the routine sanitation of camps; in the former case he is only very partially trained, and therefore could not be expected to supervise the work of trained "water sections" and "pioneer sections" placed within his unit and under his command. He would require the assistance or control of the officers of the Sanitary Bureau of the R.A.M.C. in the daily inspections. Under the scheme I have proposed, officers commanding would, after a short theoretical and practical course of training in sanitation occupying some three weeks, be competent thoroughly to supervise and control the routine work of the "water sections" and "pioneer sections" in their units, and would be quite competent—and feel competent—to obtain the results expected. The daily inspection of sanitary officers would become unnecessary and out of place, in the same way as it would be out of place for the medical staff of a great hospital to daily inspect the whole routine work of the nursing staff. Colonel Hill-Climo thinks, and rightly so, that capacity and control should be associated. I go further, and I say that capacity, control, and high interest in obtaining the results desired must be associated in one and the same officer. The R.A.M.C. might think that under the scheme I propose they would be relegating part of their proper duties to untried hands. It must be remembered, however, that numerous instances could be given where these hands have not rarely rendered conspicuous sanitary service in times past without education, training in methods, proper equipment, or the trained "water sections" and "pioneer sections" necessary. It has been shown in recent cholera epidemics in Egypt, when the number of doctors was too small, the further control of the epidemic was obtained through civilians, clerks and others being trained in the methods to be followed in a freshly attacked village or town, and they obtained the same conspicuous results as the medical staff. How comparatively easy, then, will be the work of these officers when properly taught, equipped, and provided with trained men to carry out the programme the Sanitary Bureau will have laid down, with the help of their hand-book on the details of routine, and, if further advice is required, the sanitary officer ready to clear up any difficulty. Now I fully appreciate the doubts of possibly some officers of the R.A.M.C. as to the advisability of the step I propose. Doubts which have resulted in Colonel Firth proposing the scheme of control I have referred to, which closely resembles that proposed by Colonel Hill-Climo, an officer who has long endeavoured to promote the health efficiency of the Army. I think if I were in the R.A.M.C. I might propose the same scheme, for the reason that probably these officers entertain doubts as to the readiness of the Army authorities—the Army Council—to grant the conditions I have insisted upon as a necessary part of the scheme of control which I have suggested. When this scheme was originally proposed four years ago, Colonel Firth himself was an advocate of the principles laid down. I believe that this scheme of control will

create a wide and deep interest in sanitation throughout the whole of the officers of the Army, and through them spread to the ranks they command. I believe it is the only sure way to fight enteric and allied diseases effectively. General Sir T. Fraser has added the weight of his opinion, that it is to this sanitary education, involving the whole Army and every officer, from general officers commanding downwards, that we must look for success. Why, then, should we suppose that the Army Council will take the view that the control of these diseases is not the duty of the combatant officer? The Army Council knows that the efficiency of his men is this officer's duty, and here is a cause of inefficiency on a scale far greater than all other causes of inefficiency combined. Here is a source of danger within the possibility of his control, which will undermine battalions and reduce them to mere cadres in a manner compared to which the actual mines and weapons of the enemy are mere playthings. Why, then, trouble the officer to train his men to seek "cover" or to deal with the enemy's mines and explosives, and yet leave the officer and men ignorant of the simple methods required to prevent a twelvefold greater cause of inefficiency within his power to control? Why worry about saving ounces or pounds of transport when you tolerate tons upon tons of useless avoidable transport required by preventable sickness? The Army Council doubtless will develop more advanced, more up-to-date methods, and every officer, general, gunner, engineer, or transport, must each throw in his untiring, unceasing endeavour against the common foe which undermines the efficiency of all services alike. If the Army Council, therefore, gives the training and education necessary to all officers, it must go further and mark the success these officers will attain by patient persistent sanitary effort, by distinction to the regiment, unit, or individual officer in the shape of promotion, reward, etc. If the Army Council admits this principle, then, how is it possible to attribute this distinction otherwise than following the records and report of a Sanitary Bureau and the special sanitary officers of the Army? If the Army Council is prepared to risk sanitary breakdown or disaster by denying any of the conditions which, in your opinion and mine, may materially affect success, then there is no alternative but to pass over all control both of officers and men as regards sanitation into the hands of the Sanitary Bureau and sanitary officers of the Army, though the risk of friction and impaired results by the introduction of a medical imperium within every regiment or corps may be considerable. Personally, I am of opinion the majority of combatant officers would prefer sanitation controlled by the method I have proposed. If this is the case, they must be willing to make themselves capable by a short course of training in a School of Sanitation, and be ready to abide by the careful estimation of their work and results which the Sanitary Bureau of the Army will accord. Major McCulloch says that the School of Sanitation is not a new thing.

Major McCulloch:—I did not say the School of Sanitation existed; what I said was that the idea of a School of Sanitation is not new.

Dr. Leigh Canney:—I am glad to hear from Major McCulloch that the School of Sanitation for officers is not a new idea. It is of course the logical outcome of the scheme I have proposed, and so we may take it as a good augury for the future that the R.A.M.C. and the Army are convinced, at least in theory, that such a step is the right one. Attached to the School of Sanitation might be set up a practical camp for

purposes of instruction and examination—a model Indian camp capable of illustrating all the possible defects in sanitation. Major McCulloch has referred to the various agencies concerned in the causation of enteric fever. I think if I might refer him to an article in the Enteric Fever number of the *Practitioner*, two years ago, he will agree with me that I have given due weight to the whole of the known factors in its causation. It would be impossible to conceive of a scheme of prevention which did not provide for the isolation of enteric cases and for the organisation of suitable means to prevent flies and dust becoming possible carriers of the disease; and in this connection great weight must be attached to Colonel Hill-Climo's insistence upon the duty of personal cleanliness.

Major McCULLOCH :—Will you allow me to interrupt you for one moment? An idea seems to have got abroad that I have been trying to criticise Dr. Canney's scheme adversely. The very opposite was my intention. I only wanted to point out that enteric fever is a completely preventable disease. As a matter of fact, the views that Dr. Leigh Canney gives expression to in his paper are the views which are held by all Army medical officers, and I have simply been trying to point out to the lay members of this meeting that there were many difficulties in the way of absolute prevention of enteric fever, and I have tried to indicate them. The great desire of the Army Medical Service is to suppress enteric fever entirely. We wish to close all the avenues of enteric fever—the water-borne avenues as well as others.

Dr. LEIGH CANNEY :—I am glad to hear from Major McCulloch that the views I have expressed are the views of all Army medical officers, and I am sure it would be better for the end we all have in view—the efficiency of the Army—that any minor differences, if existing, should not be magnified or distorted in criticism in a manner likely to mislead the public. Major McCulloch pointed out that enteric fever was not yet abolished in England; such was the case. There still remained a residuum due to channels of infection the Public Health Acts were not designed to close; but because the civil community tolerated at present a small residuum of enteric fever, this hardly seemed to be any reason for the Army tolerating twenty-four times this amount in India, and fifty-two times the amount in South Africa. Major McCulloch states that the figure I quoted—5,995—as being the loss to the Army in India and South Africa under the heads referred to is incorrect. In the official report for 1903, however, he will find that this is the total shown under the three causes : death, invaliding, and "discharged finally as medically unfit." Major McCulloch omits the last group from his figures, but they are included in mine. Sir A. De Renzy has given recent instances supporting strongly his conclusions based on long sanitary experience in India of the power of sterilised water to arrest enteric fever and cholera in camps, and practically to exclude them. Finally, I cannot conclude without congratulating the Army after the cordial and patient consideration by this distinguished audience of the paper I have read, on the growing number of those who believe that the greatest step to be made by the Army towards efficiency is along the lines of organised detail, precision, and unrelenting effort in sanitation.

The CHAIRMAN (Major-General Sir T. Fraser, K.C.B., C.M.G.) :—I am in the unfortunate position of having, as it were, to decide where doctors disagree; but as I am a layman in medical matters, I will not

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[redacted]

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try. I can only say on your behalf that we are exceedingly indebted to Dr. Canney for the very interesting lecture he has given—a lecture which shows great study of the question and a good deal of thought and anxiety to benefit the health of the Army. In one sense we will all agree with the lecturer, namely, that if we want to save the Army from itself with regard to sickness, we must carry the Army from bottom to top with us. For that reason my last word to you all, especially to the Army and other medical officers of the country who are so competent to judge on this question, will be this: that we ought to endeavour to medically educate and convince the Army as to the importance of sanitary questions constantly, continuously, and effectively. We must remember the conditions of war are not those of peace. In war the best schemes will fail: the most stringent orders will be of no avail, for men will not die of thirst on any one day to avoid the risk of enteric on that day fortnight. All that can be done is to make men realise the gravity of their danger, and the value of such protective means as circumstances permit. I now, on your behalf, cordially thank the lecturer for the very interesting lecture he has given us.

FIELD ENGINEERING IN THE LIGHT OF MODERN WARFARE.

By Brevet Lieut.-Colonel G. M. HEATH, D.S.O., R.E.

Wednesday, 1st November, 1905.

Major-General Sir REGINALD CLARE HART, V.C., K.C.B., K.C.V.O., *p.s.c.*, in the Chair.

I HAVE been asked to lecture on Field Engineering in modern war.

Turning to the Regulations for Engineer Services in War, I find that their duties comprise landing stages, roads and bridges, making and working of railways, telegraphs, and balloons, and, I might say, kites, preparation of camping grounds, water supply, canals, field works, electric land mines, attack and defence of fortresses, posts and positions, and any other such engineer services as may be required.

Now, this is much too long a list for one man to go into in an hour, so I propose this afternoon to deal with field fortifications.

Field fortification is a very old and simple science, based principally on common-sense. Judging by the sculptures of the times, the ancient Egyptian bowmen protected themselves by a prickly hedge. The Romans and Britons have left traces of intrenchments all over this country. The Romans, I believe, invariably intrenched themselves at the end of each day's march. Coming to later times, we find that William the Conqueror, on landing in England, brought with him three wooden castles in pieces, all ready for framing (evidently the ancestors of our South African blockhouses sent up in pieces from Durban). The invaders, quoting the old chroniclers of the times, "before evening, had finished a good fort on English ground, and they ate and drank and slept, and were right glad that they were ashore."

The object of field fortifications, according to our latest text-book, is to strengthen ground, and by thus economising the numbers of the defenders, to swell the force available for offensive movements. Nobody will, I think, quarrel with this definition, for in almost every way you look at it this is its true use, making always the reservation that the men economised are not necessarily to be used on the ground selected for defence, but may be used for offensive action, or with a view to eventual action, hundreds of miles away.

Take for example a series of fortified posts on a line of communications. In South Africa Lord Kitchener, realising the value of a few men behind well-thought-out defences, reduced the garrisons of

TRAVERSED FIRE TRENCH WITH LOW COMMAND.

TIME REQUIRED ½ TO 3 HOURS IN EASY SOIL.

these posts to a minimum, thereby saving up men for action against the Boers elsewhere. The Normans, eating and drinking, and recovering from sea-sickness, were saving themselves for vigorous action at the battle of Hastings. These are, perhaps, rather far-fetched examples of what I may call the strategic use of field fortifications. Their more obvious value is to bring about what may be called a strategical counter-attack, that is, when a general perhaps numerically inferior to his enemy, uses a part of his forces to hold one of the enemy's advancing columns, while, having by a skilful use of intrenchments economised men, he is enabled to throw an overwhelming force against the remainder. With the large Armies of the present day necessarily spread over a great tract of country, there would seem to be special opportunities for this class of work. Kuropatkin seems to have had this operation in view when he held the position at Shu-Shan-Pu (south of Liao-Yang), and moved troops to his left with a view to enveloping the Japanese right. But delayed, no doubt, by the difficulties of the country, he was forestalled by the astute Oyama, and the vigorous action of the Japanese generals saved Kuroki and the situation.

Again, Sherman in 1864, by intrenching a part of his force in front, and making a wide turning movement with the remainder against the Confederate communications, forced these to evacuate many excellent positions.

Talking of counter-attack, I am not quite sure that I believe in the tactical value of field fortifications except for purely passive defence and the material protection given to the men in the trenches. I mean that the days of counter-attack on the defended ground close to the position are, except in very favourable circumstances, over. When I was a cadet at Woolwich, we used to be made to draw plans of intrenched positions, and got bad marks if we neglected to put in a little curly arrow around the edge of the position labelled "counter-attack." In the wars of Frederic and Napoleon, decisive effect was sometimes produced by hurling masses of cavalry against the flank of the attacking infantry. The containing power of the modern rifle and modern gun is now too great. An attacking general who knows his business, will take care to guard the flanks. Infantry attacks take a long time to get to decisive ranges, and there would hardly be time I think for this class of counter-attack to come off, while an attack by masses of cavalry are thought by many to be out of date. The Russians made several attempts, but were, I believe, invariably repulsed. By this I by no means wish to imply that counter-attack with the bayonet—the "Up, Guards, and at 'em" business—is out of date, or that even small counter-attacks are not useful to worry the enemy, but they won't be decisive, and the reserves you have hoarded up by skilful use of ground will have plenty to do in resisting outflanking movements, or may possibly be useful against a beaten Army that night or the next day, or in the event of the defenders being beaten, by taking up a secondary position, they may prevent the defeat becoming a rout.

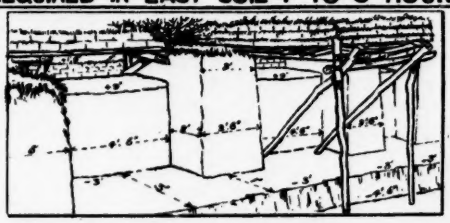
But I am, perhaps, wandering from the subject of my lecture. Having settled that the object of field fortifications is in all cases to economise men, I must endeavour to show how this economy can be best carried out under modern conditions. Now field fortifications like, say, shooting pheasants, cannot be learnt entirely out of books. The first requisites for a good shot are a good eye, that is, the correct

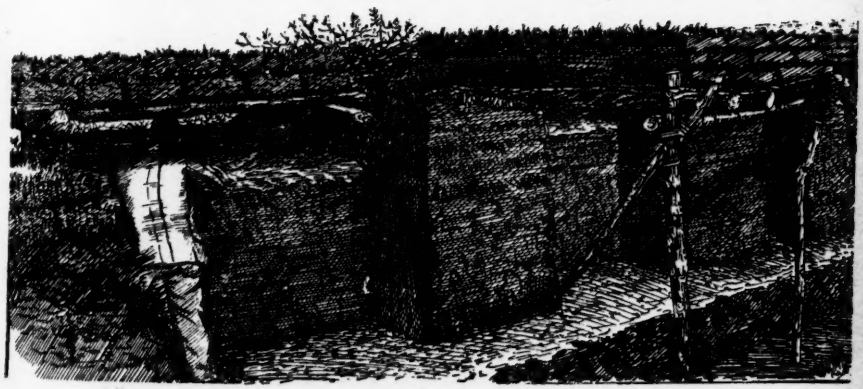
working of hand and eye together, and a knowledge of pace and distance. The first requisites for a good field engineer are a good eye for ground, and a knowledge of fire effect. The eye for ground can only be got by practice out of doors. One of Alexander's generals made an invariable practice, when he was out riding, of setting himself little problems of attack and defence which he worked out in his head on the spot. It is by this sort of study that the eye for ground is obtained. The practised eye for ground will at once recognise the strong and weak points of a position, and if, added to this, he has a thorough knowledge of fire effect—by which I mean the art of obtaining the best possible value from *his* guns and rifles—he will know how to put his defences in the proper place.

FIRE AND SHELTER TRENCH COMBINED.

FIRE TRENCH DEEPENED AND OVERHEAD COVER ADDED.

TIME REQUIRED IN EASY SOIL 4 TO 6 HOURS.





The siting of trenches is a most important point, and one that is often not sufficiently studied. The best position for a trench on a given bit of ground is, I know, a debatable question, but to my mind, you cannot possibly go wrong if you put your trench where the best possible fire effect is to be obtained, and this best effect is undoubtedly obtained—provided always you can see your enemy—by "grazing" fire. In the 18th century text-books you will find that the gunners were recommended not to put their guns too high up, for, says the

writer of one of them, "If the gun is placed high up, the cannon ball will only hit the ground once. Have it low down, so that the ball can bound along the ground; it will thus create great havoc if it happens to strike a column of the enemy." We don't use our guns quite that way now, but the principle is the same, the trajectories of the arms in use must be studied. The pictures on the screen are taken from the latest text-book—you are all, no doubt, well acquainted with it. An examination of the diagrams will show you the fire effect produced by a squad of men firing over various shapes of ground. The trench should obviously be sited so as to get as great a depth of dangerous space (for the attacker) as possible.

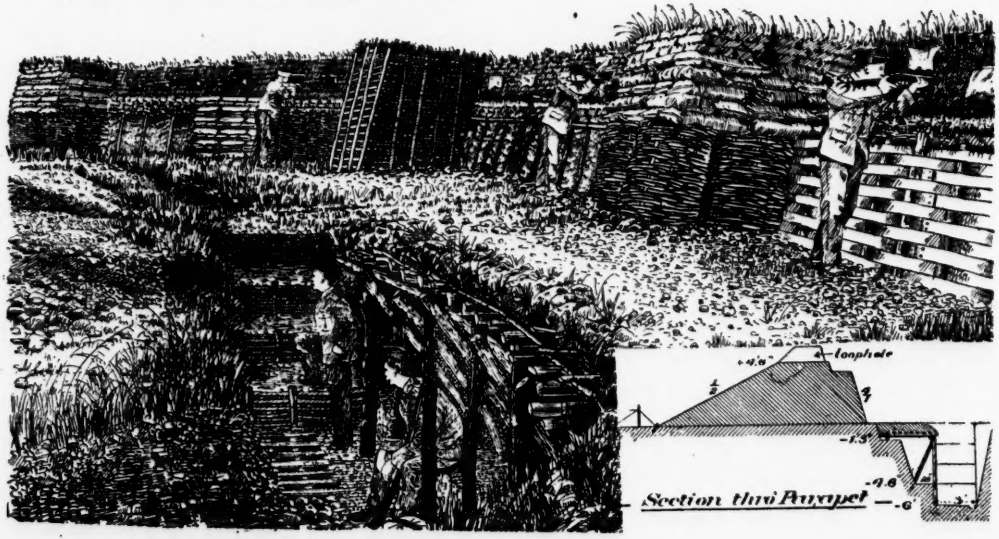
The best position of a trench for obtaining this kind of fire obviously depends on the nature of the country, for, besides "grazing" fire you want a good long bit of it, four or five or six hundred yards if you can get it. In South Africa, in India, and no doubt in many parts of Manchuria, "grazing" fire is best obtained by going down to the level ground at the foot of the hills. Delarey was a great exponent of it at Magersfontein. Those of you who were there will remember he placed the bulk of his trenches in advance of the foot of the "kopjes," posting a few men firing black powder on the hill above to draw the fire. Delarey thoroughly understood the use of modern rifles with smokeless powder. Again, at Shu-Shan-Pu, I believe, 200 Russians in a trench on the plains held out all day and all night against most desperate Japanese attacks; I hope to come to that later. Many people say it is all very well to put your trenches down at the bottom of the hill, how are you going to reinforce them? How are you going to withdraw from them? I say: "*Do without.*" In the absence of communicating trenches or other cover, reinforcing will be impossible wherever your trench is, unless against all rules it is up on the sky-line, or unless from the nature of the ground you are able to hold a position on the rear crest (which latter position is, by the way, sometimes the most favourable), and in an action you really mean to fight out, you don't want your men to withdraw. Any reliefs necessary can be carried out at night. It is far better to put the necessary number of men in the best fire position, give them all the material protection possible, and let them stick it out. This does not, of course, preclude the use of supporting troops in good fire positions above the main fighting line, but your supports *must* be in good fire positions, not, as I have often seen them, stuck behind a hill where they could never do any good to anybody, and from whence very possibly they could never reach a fire position when most wanted. Another disadvantage of a trench high up on the hill is that in this case the artillery of the enemy can generally cover the advance of the attacking infantry until these are close up to the trenches, whereas, if the trench is low-lying, this close co-operation will be difficult. Those of you who were present at Almands Nek, near Volksrust, will remember how well our artillery covered the attack until it had almost reached the top of the hills. The effect of this artillery fire was plain to the spectators, for the Boers, who, by the way, were on the sky-line, were obviously too "jumpy" to do anything but the snappiest of snap-shooting—many, no doubt, contented themselves with firing over the tops of the rocks without pretending to look over their sights.

However, in most countries owing to the irregularities of the ground it will be impossible to get a field of fire of adequate depth

HIGH COMMAND REDOUBT

WITH TRAVERSES, COVER, & OVERHEAD COVER.

LOOPHOLES BLINDED IN CANVAS ON INSIDE TO PREVENT THEM SHOWING AGAINST THE SKY, & SHOULD BE SCREENED ON OUTSIDE WITH TUFTS OF GRASS &C.



from a trench at the foot of the hill, and some intermediate position will be necessary.

Generally, in choosing ground for the defence, I think we are apt to attach too much importance to high ground. A great upstanding ridge like, say, the South Downs, is a very attractive position to hold; but we must remember that such a ridge also attracts the eye of the enemy, and moreover its slopes are often not very convenient for good fire effect. The ground as a whole need only be high enough to enable the defender to see the enemy's movements while screening his own, though a high commanding point in the neighbourhood is useful as an observatory for the officer conducting the defence. I will go further and say that ground commanding the defence is not always a disadvantage. The position held by the Boers at Paardeberg was more or less commanded by our artillery, but in our first attacks we did not get much nearer than four hundred yards. Again, at the battle of Belfast, the Boers held the foot of a glacis which sloped upwards for about 1,700 yards from the firing line. Our infantry, however, were unable to advance over the crest of the hill, and the Boers held their position for two days, evacuating it when their left was turned. Such a position can rarely be shelled effectively by the enemy; the attackers consequently lose their strongest support.

The fact is, that 30 feet of command at a range of 300 yards, or 300 feet of command at a range of 3,000 yards only, gives an angle of depression of 1 in thirty, or about 2°; hence a comparatively small mound will give shelter, provided the reverse slope, *e.g.*, the interior slope, of a trench is steep enough. The positions held by the Boers on the plains at Modder River, and again at Paardeberg, contained all the essentials necessary for passive defence, except, perhaps, facilities for getting away, and the chief of these essentials were excellent fire positions and invisibility.

Invisibility is, as we all now know, a most important consideration in these days of smokeless powder. When black powder was used, invisibility was out of the question; moreover, high explosive shell had not reached a great development. A good thick parapet to withstand the shell of the day, combined with a strong obstacle, was *de rigueur*. I have here a picture of an 18th century field work, which does not differ much from the sort of profile I was taught as a cadet, or from some of the works—to judge from the newspaper accounts—which were thrown up by the Russians in the early part of the war.

Invisibility is now well understood. It is fairly easy to obtain by careful siting and screening. The art of screening should be particularly studied. Because there are trees or bushes near you, they need not necessarily be cut down; you can often arrange to fire through such obstacles yet be screened by them. If, for instance, you study an orchard in Kent, you will see that owing to the fact that the branches begin some feet above the level of the ground, you can get a good field of fire, often for several hundreds of yards, yet be absolutely screened from the enemy's artillery or a covering party of his infantry beyond.

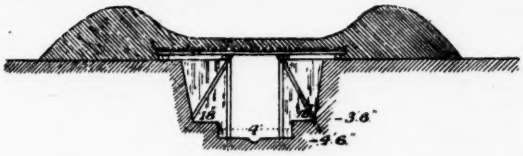
I maintain that a line of men in an invisible trench are practically safe from shell effect, even under the *rafale* system.

I maintain, further, that a preparatory bombardment against a properly intrenched position is simply waste of ammunition. How

different is the fate of men posted behind clearly visible targets is shown by the unfortunate Russians on the top of 203 Metre Hill, and by the brave Johannesburg Police who defended the kopjes at Bergendal. A newspaper correspondent, describing the appearance of 203 Metre

— HASTY REDOUBT. —

BLINDAGE IN REAR OF FIRE TRENCH.



— Section thro' Blindage. —

Hill after it was taken, compares it to a heap of road metal; but of course the defenders here were particularly at a disadvantage as regards shell-fire, because, owing to the hardness of the ground, their defences had to be built up of stones and rocks.

We are told in "Combined Training" that the flanks of the position must rest on obstacles. More often than not, however, these obstacles are illusory. The Russians on the Yalu, and again at Nan-Shan, are cases in point. In the former they appear to have considered the precipitous ground on their left sufficient to secure that flank; but it was just here where the Japanese attack was decisive. At Nan-Shan the flanks rested on the sea, but the Japanese waded through it. The fact is, that in nearly all cases flanks must be protected by men in suitably placed trenches, or by a mobile reserve.

So much for the defence of a position on broad lines. Where time admits, it is obvious that the preparation of a second position to cover a possible retreat should not be neglected.

Let us turn now to details. The details necessary for economising men by protecting their bodies are simple, and the only necessity to enable a person to make a good design—given time, tools, and labour—is again a knowledge of fire effect. But this time we must look at this fire effect from the enemy's point of view; hence the design of works has always varied with the nature of the arms and projectiles of the period. The armoured train and armoured wagon of South Africa are only evolutions of ideas formulated by the ancients. At the battle of Hastings a wattle fence was good enough until the defenders were enticed out, whilst against savages, any wooden stockade or solid fence, backed by good men, will do, as at Rorke's Drift. But against modern shell and bullets something more scientific is required.

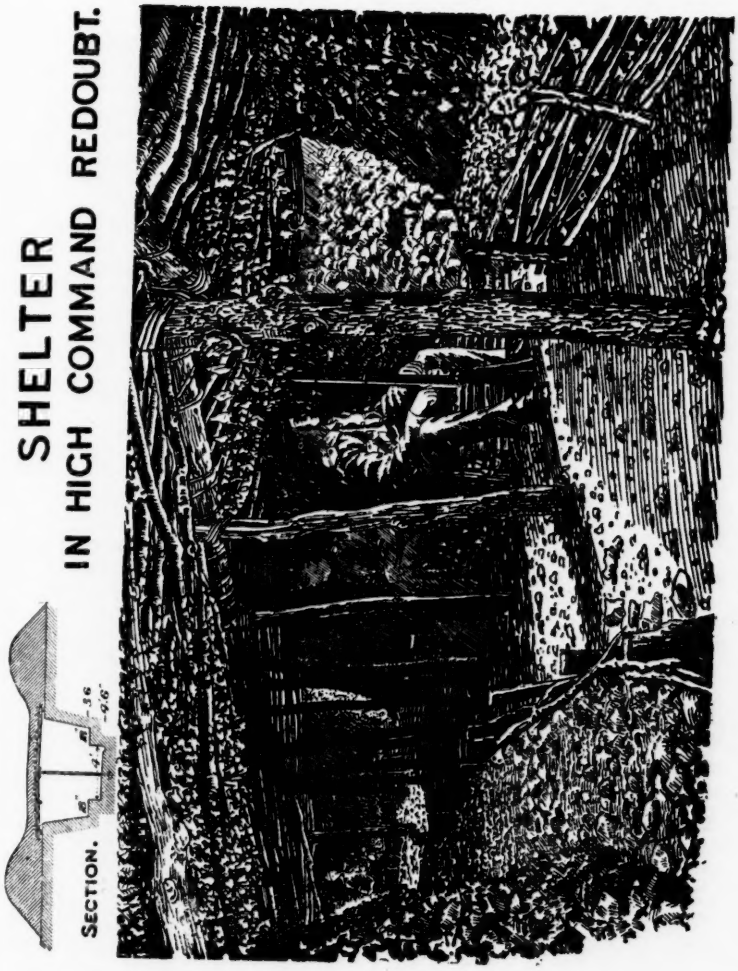
I am not one who thinks that salvation is found in the exact form of a trench. The conditions of time, labour, and materials will not always allow you to make the form of work depicted in the text-book, but there are certain principles which must be studied if the object we have in view, that is, the economy of men by protecting their bodies, is to be carried out thoroughly.

As I said before, the first principle is a knowledge of the effect of fire from the enemy's point of view. Let us begin with the gun. The picture on the screen is a well-known plate out of a Chatham text-book showing the angle of descent, and effect of bursting shell. Here again is a picture of a redoubt, filled with dummies, which has been struck by high-explosive shell. Now, to show you how we hope to minimise these effects, I have pictures of the most up-to-date trenches Chatham can produce.[1] I don't by any means say they are the best trenches to make under every circumstance; equally good ones have from time to time been devised. They only represent a type showing one way of applying the materials at hand, and I think they are pretty good. You will note particularly the protection given to a man, even without head-cover, who places himself close up to the interior slope. You will notice various sorts of head-cover and overhead-cover. This latter is particularly useful against shrapnel of all sorts; miles of overhead-cover were made at Port Arthur.

The object of hostile artillery fire being to keep down the heads of the defenders while their infantry is advancing, our main object should be to allow the defender to use his rifle with good effect in comparative safety while himself under this artillery fire. With this object, overhead-cover, or *at least*, head-cover, should, wherever

[1] The plates referred to are now reproduced in the Manual of Military Engineering, 1905 edition.

SHELTER
IN HIGH COMMAND REDOUBT.



SECTION.

possible, be provided. In arranging these details the offensive power of the rifle should never be sacrificed for protection. This axiom should particularly be kept in mind in designing loopholes, and, from this point of view, the long, shallow (slit) loophole is probably the best all-round type. The size of the opening will depend on the field of fire, a deeper opening being necessary when the field of fire is long and the back-sight has to be used, than if the field of fire is only three or four hundred yards.

In testing a loop-hole, by-the-bye, it is not enough to look over the sights of the rifle, or you may find that while the line of sight is clear, the muzzle is pointing into the roof of the loop-hole. The only way to properly test it is to pull out the bolt and look through the barrel.

Loop-holes are always rather difficult to arrange. To meet this objection, a steel loop-hole plate has been devised, and can be drawn from Ordnance Stores for special purposes. In connection with overhead-cover, I might remark that it has been found that one sheet of corrugated iron placed, say, at a slope downwards from the line of fire of about 1 in 4, is practically proof against howitzer shrapnel. A thickness of two sheets is absolutely safe. In the pictures on the screen you will notice that great care has been taken to screen the parapets. [Types of splinter-proof chambers connected by communicating trenches to the firing line were also shown.]

For a strong defence other things are necessary besides trenches; I allude especially to obstacles. These are useful at all times, and more especially against night attack. They must be under the close fire of the defence, by which I mean from 20 to 100 yards, for although an obstacle 400 to 500 yards off may be good enough in the day time, it is no good having it further off than you can see at night, and the distance you can see on the brightest moonlight night is certainly not more than 200 yards (except against a sky-line). The Russians made this mistake more than once. They put their obstacles so far off that the Japanese were able to cut them at night without serious loss. If you accept my theory of counter-attacks, that is, that a counter-attack will not take place close up to the position, obstacles in front of the trenches can be practically in a continuous line.

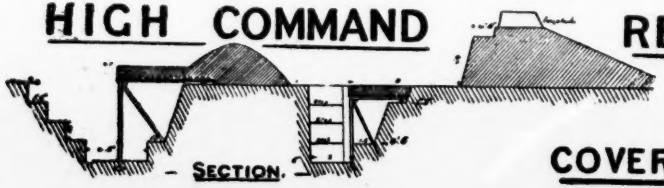
Combined with the obstacles we can arrange alarms. These will be particularly useful in the defence of small posts.

The illumination of the foreground by night is a very important matter, and is receiving attention at the present time. Search-lights properly worked so as not to show up your own side are probably best. Their use is now being studied both in attack and defence, and valuable *data* have already been obtained; but we cannot always have search-lights, so we are trying acetylene and other flares. These kinds of lights are portable and give fairly good results. They can be arranged in front of the position with a string running back to the trench in rear, so that the light can be turned on and off as required.

From the attacker's point of view it is desirable to find some means by which the search or other lights can be rendered ineffective. Smoke forms a good screen against search-light. It can be readily produced by lighting bags stuffed with straw, and is effective so long as the wind is not too high.

An obstacle much employed during the late war was the land mine, but they do not seem to have had any real influence against the attack.

HIGH COMMAND REDOUBT.



SECTION.

COVER FOR SUPPORTS.

The destruction of wire entanglements seems to be a difficult matter. Even 30 lbs. of guncotton exploded under the entanglement makes only a comparatively small gap. The only reliable method seems to be to attack wires with wire-cutters, bill-hooks, and axes.

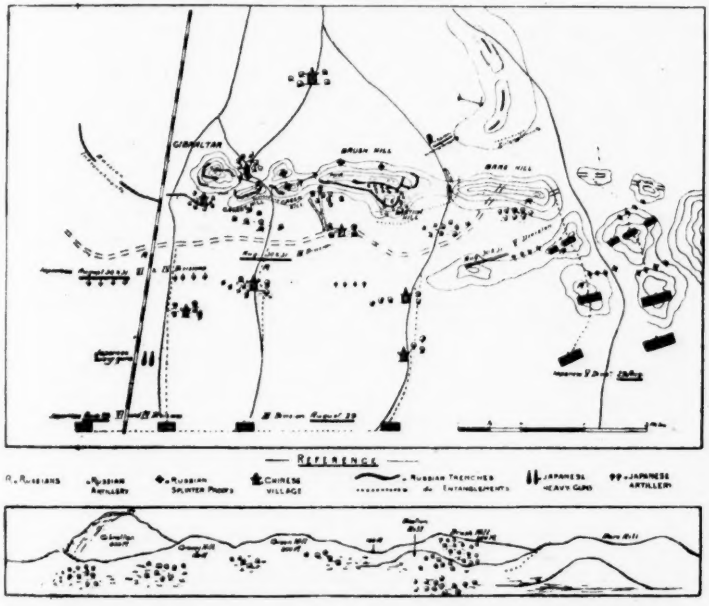
Now there is one very important branch of field fortifications which I have not touched on, that is, the use of the spade in the attack. The only way of taking trenches in front and by day is to produce such a heavy covering fire at decisive ranges that the defenders, if not driven out by this fire are paralysed, and an assault by resolute men becomes comparatively easy. These covering troops may have to occupy advanced positions and remain in them a long time; they should if possible intrench themselves. This is usually only possible at night, but attempts are being made to devise an efficient tool to enable attacking infantry to make some sort of cover while lying down. In this connection it is possible that use might be found for portable bullet-proof shields, but bullet-proof steel weighs eight pounds to the square foot; it would therefore be very difficult to arrange complete protection for a man whilst he is advancing. Shields might possibly be carried up to the position to be occupied by such covering troops, and if placed in a line on the ground they would give some protection until a proper trench could be dug; but in any case their use must be very limited.

Modern attacks may take several days to complete, and with every successive advance the men should intrench. This was done by us in a perfunctory way at Pieter's Hill. With the Japanese it was systematic. During the last week of the advance on Paardeberg we progressed by "flying" trench work. It seems to me that our present policy of taking the intrenching tools off the men and putting them on to mules or into carts is a wrong one. It is the result, of course, of the South African War. The ground there was usually hard—the small intrenching tool could make no impression—and moreover there were generally plenty of stones with which to build sangars. Carts will lose their way, or the mules may be shot; at any rate, the tools will not be on the spot when most wanted. Because soldiers at times require intrenching tools it does not by any means follow that they need always be burdened with them. They can be carried in carts or on mules when not likely to be required, but when going into a fight a proportion of the infantry *must* have their intrenching tools on their backs. Numerous portable tools have been invented, and great ingenuity has been displayed in devising a pick and shovel combined in one implement. These have always failed to give satisfaction. A pick and shovel to be serviceable must be separate implements and somewhat heavy; but extreme lightness would not seem necessary if the soldier is only obliged to carry them when going into action.

The principles of field fortifications described above, both in attack and defence, were all exemplified at Shu-Shan-Pu (south of Liao-Yang). Through the courtesy of the Editor of the *Times*, I am able to show on the screen a picture of the defences. It will be remembered that towards the end of August, 1904, the Russians held a line 25 miles long in a semi-circle to the south and east of Liao-Yang. The Japanese were advancing in widely separated columns. Here apparently was a good opportunity for strategic counter-attack by the Russians. By intrenching themselves strongly at Shu-Shan-Pu, against Oku's advance from the south, they would perhaps have

an opportunity of crushing Kuroki in the east. It was perhaps with this idea in view that they spent weeks in fortifying the position at Shu-Shan-Pu. The intrenched position at Shu-Shan-Pu was only 4½ miles long. This 4½ miles, however, had had, in the words of the *Times* correspondent, "every device known to modern engineers in the matter of earthworks used upon it. Here there were no shallow trenches and death-trap citadels, as at Nan-Shan. Wherever the contour of the position required it, a double tier of trenches had been cut into the hillside, one low down to give scope to the flat trajectory of the modern rifle, the other higher up, but well below the skyline. The trenches, which were 4 feet 6 inches deep, and narrow, had had their front carefully turfed, so that it was, at artillery range, almost impossible to distinguish the parapets. Each section of the defences had its covered way leading to commodious

BATTLE OF SHU-SHAN-PU.



splinter-proofs cut into the reverse of the position. From the foot of the position, for 1,200 yards along the whole front, the millet had been cut, while there was no portion of the actual approach to the position that had not been prepared with obstacles." The Russian guns were skilfully masked; they trusted to indirect fire, and consequently much of the Japanese shell was wasted, since the Japanese gunners never discovered the masked positions. A high hill on the right of the position was used as an observatory, and was connected with the Russian batteries by telephone. That nothing might be wanting, a light railway ran from the rear of the position to the city of Liao-Yang. This position was assaulted three times: first on the evening of 30th August, 1904; secondly, in the early hours of the

morning of 31st ; thirdly, on the night of 31st. All these assaults failed as a whole; but on the night of 30th-31st a Japanese company, working down from some high ground on the left of the position and through a gap in the wire entanglements, were enabled to turn the Russians out of the lowest trench on that flank. These brave men were, however, shelled out of the trench next morning by their own artillery. Subsequently, under the covering fire of Japanese infantry, who had intrenched themselves on the high ground immediately above, the attack against the left flank was resumed, and eventually the lower trench was again occupied, while the Russians retired along the communicating trench to the supporting trench above. The Japanese never got any further, and a fourth assault was ordered for the 1st September, but for some reason or other the Russians retired on their second position close to Liao-Yang city.

It is noteworthy that in clearing the obstacles on the Russian left flank prior to the final assault on the lower trench, the Pioneers lost 75 per cent. of their number in eight minutes; "but the last devoted few, in spite of point-blank fire, in spite of contact mines, and in spite of pits, had made an opening."

It is also noteworthy that a counter-attack was made by the Russian left on the night of the 31st August against the right of the attack, but it was repulsed.

It is permissible to suggest, in connection with the first part of my lecture, that had the Russians in the lower trench on the left of their position not had easy communication to the rear, they would perhaps have maintained their position. This is, however, merely a surmise, and no doubt it is better to make the communications if plenty of time is available.

Now, gentlemen, I have not time to go into the important matter of defence of posts, so that is all I have got to say about field defences.

I cannot help thinking that there is room for closer touch, to our mutual benefit, between those who are supposed, rightly or wrongly, to be experts in this art, and the officers and men who have to use the works. This does not only apply to defence works, but to simple forms of bridging, camping arrangements, water supply, etc.

The annual Line Class at Chatham has had to be abolished, owing to the amount of other duties infantry officers have to attend to. In the last year or two we have been able to help battalions quartered at Chatham, and assist at camps of exercise in various parts of the country by sending out instructors from the School of Military Engineering. I think this assistance has been much appreciated. I do not see how the majority of infantry officers who get no instruction in this line after leaving Sandhurst can, without assistance, be expected to keep up to date in these matters, though I am aware that many of them manage to do so.

Surgeon-Major W. T. Black (late A.M.D.) :—I am one of those who were present at the siege of Sebastopol, and who roamed round the works a few days after it was taken. It was evident to everyone that the Russian fortifications were repaired as soon as they were damaged, and were kept in a good condition, which accounted a great deal for the protracted nature of the siege. All the fortifications were evidently made good the night afterwards, or as soon as possible after the cessation of the bombardment. What rather puzzled and astonished our artillery at that time was the small effect which the bombardment with solid shot

had upon the works, and even the bombardment of the sea forts at the entrance of the harbour by the ships had little effect in the destruction of the works; but when we got in the works and saw them, the surprise was lessened at once. It was all due to the nature of the rock with which the works were built; it was a soft marly rock, and the shot embedded itself in it, just as a shot would embed itself in putty or paste. The stone was not damaged and did not crumble; in fact, it was hardened by the impact of the solid shot. This was surprising to our engineers and artillerymen at the time, but they afterwards got over it by resorting to high-angle fire with the shells which were made at the time. The final collapse of the fort was occasioned by the injury to the works due to our improved fire. I dare say all these points have been recorded in the works published by those who superintended and conducted the operations.

Lieut.-Colonel J. E. Capper, C.B., R.E. :—I have always thought that with reference to the siting of trenches, too little regard is paid to the conditions under which the Army has to fight. The question of taking up a position on the top of a hill or the bottom of a hill seems to me to be largely dependent on what you are there for. If you are in a position where you are content to wait for the final assault, the taking up of the position near the foot of the hill seems to me to be correct, because there you wish to see the ground that may not be perhaps close under your trenches but is within decisive rifle fire of you; whereas if you are only fighting a delaying action, without any real intention of staying, it seems to me the proper position to take up is the top of a hill, where you get a great view, and where you can bring long-range fire to bear on the enemy and make him deploy particularly early. In the first case, one must consider the question from the point of view as to how far the actual command that you obtain is worth getting at the sacrifice perhaps of a view of the near ground, but bringing into view ground at a greater distance. I do not think it is a question which is dealt with in our text-books, and I would like to ask the lecturer's views on that particular point.

Lieut.-Colonel Heath :—I gather that Colonel Capper said that he did not always want to entrench down at the foot of the hill, that one only wanted to entrench where the best fire effect could be obtained, when you are going to fight a decisive battle.

Lieut.-Colonel Capper :—That is practically what I said.

Lieut.-Colonel Heath :—But you also said that when you are going to fight a rear-guard action you must entrench high up. That is certainly the case. If you have to get away and you are being fired at, you cannot very well go up the side of the hill; you lose too many men. In that case I should put the men at the top of the hill. In my lecture what I meant was that where you have to fight a decisive action you should put your trenches where the best possible fire effect can be obtained. I think Colonel Capper also said that you need not see the ground immediately in front of your trench.

Lieut.-Colonel Capper :—In a decisive action. It depends a great deal on circumstances. It is a question of how far you might sacrifice the view of the immediate foreground, to ranges, say, of from 200 yards right

up to your trench, in order to get command of the ground and see a little further.

Lieut.-Colonel HEATH :—My own view is that when you are fighting a decisive action you must defend the immediate foreground right in front of your trench. You may get a good deal of fire further off, but I should like to be able to hit the man attacking me right up to the edge of the trench in any case.

Colonel F. W. ROMILLY, C.B., D.S.O. (Commanding Scots Guards) : —I should like to make one or two remarks with regard to the question of carrying entrenching tools. I quite agree that it would be a most admirable thing if entrenching tools were carried by the infantry, if you knew which were the actual infantry that would take the position; but it often happens that the first infantry who attack are not able to hold the position, and it may be that the supports who follow them would require the entrenching tools. I do not know how you would get to know which brigade or battalion you should give the tools to. The light tools are, I think, absolutely useless; you must have the big tools. Another point on which I absolutely agree with the lecturer is with regard to the preparatory bombardment. I think a direct fire bombardment is absolutely useless against a well-entrenched field force; but if you can possibly get a battery, or even machine guns, on to the flank of a line of trenches, good work can be done by means of such indirect or flank fire. I have seen some terrible execution done in that way. I saw a trench once in which there were lying a thousand dead men during the Suakim campaign in 1884. It is true they were Dervishes, but they were armed with rifles. They were entrenched in Paardeberg trenches, as we now call them, and the whole lot of them were dead, simply due to the fact that two machine guns had got on to the flank of the line and killed every single man in the trenches. We thought the trenches were occupied, and the men were rather shy of attacking them, because they thought they were strongly held.

The CHAIRMAN :—Did I understand you to say that you approved of the men carrying portable tools?

Colonel ROMILLY :—No, not the light tools. I approve of them carrying the heavy tools; but the difficulty that I see is, how you are to know to whom you should serve them out.

Lieut.-Colonel HEATH :—I did not intend to say that you were to deal out the tools to special parties. I am afraid I did not make myself plain. I meant that all men going into action should be provided with a proportion of tools. My point was that the men need not always carry these things on the line of march. If shields are ever introduced—I do not think perhaps there is much use for them—they will only be used by special men who carry them to the front for special purposes With regard to the question of preparatory bombardment, of course, if you can get guns—machine guns or anything else—enfilading untraversed trenches, you can shoot the men in the trenches, if they sit in them, before your infantry get up there. What I meant by preparatory bombardment was, several hours' bombardment of the position and then launching your infantry to the attack. It seems to me that

the use of the artillery is to cover the infantry right up to the position as far as you can, and beat down the fire of the enemy. It is no good firing at an entrenched position for a day in the hope that you will demoralise the men holding it.

Lieut.-General E. P. Leach, V.C., C.V.O., C.B.:—I think perhaps it is rather a poor compliment to the lecturer that, with so many of us here present belonging to his own corps, there are so few of us who are apparently willing to make remarks upon the lecture he has delivered. I think I express all your feelings in thanking Colonel Heath for the lecture he has given to us. Colonel Heath has dealt largely with the details of Field Fortification as now understood with the experience gained in the late war, and with the class of field fortifications which our troops are likely in future to have to throw up. I would like to refer, not to the main part of the lecture dealing with the details, but rather to his last remarks in connection with the training of infantry battalions and the instruction that they can receive from the Royal Engineers. Large changes have been made in our corps, changes which throw upon us in the future the responsibility of largely working with other branches. The training of the infantry can very well be carried out simultaneously with the training of Royal Engineer field companies, and infantry battalions will gain very largely if their field training can be made to synchronise with the training of any field company that happens to be in the neighbourhood. I have had a small part during recent years in training infantry battalions in the North of Ireland, and finding that in the schedule laid down for company training a portion was devoted to field engineering and entrenching work, I asked commanding officers to delay that portion of the training of their battalions until I could obtain from the Curragh, which was outside my district, a small detachment of Royal Engineers from a field company R.E. to assist that training upon a general scheme. We possessed the advantage of a most excellent camp, some thousand acres in extent, with ground undulating, sandy, easy to dig, and presenting every variety of feature. I succeeded in persuading my commanding officers that if the three battalions which were encamped upon this particular site would combine to carry out their field engineering training together under the command of one of the commanding officers, each devoting a week to their training, that they could, by combining, take up an extended position, that each battalion could take a section of the position, place the whole in a state of defence, and all receive the advantage of the instruction that could be given by the small detachment of Royal Engineers. It was carried out most excellently. An excellent commanding officer took charge. Each battalion in succession took a week at the works. A position was prepared, and when it had been prepared and placed in a state of defence the three battalions had very great experience given them in attacking and defending it. This, I think, shows what may be done if our field companies are in the future utilised in the same direction. I believe the same lines are being followed more or less at Aldershot, and I am sure that during the present year a great deal of good work has been done in connection with the training of the 3rd Cavalry Brigades in Ireland, where a field company from the Curragh, a battalion from Dublin, and the cavalry brigade, assisted by men from H.M.S. "Donegal," all took part in simultaneous work within ten miles of Dublin. I think it is unnecessary for me to say more on this point, but I feel perfectly certain that in the future the work of field companies can be largely utilised in connection with the training of other branches of the Service.

The CHAIRMAN :—I think Colonel Smith-Rewse can supplement what General Leach has said by telling us of the assistance he was able to give to the cavalry at Canterbury.

Colonel H. W. SMITH-REWSE, C.V.O., R.E. :—I did not come prepared to take part in any discussion, and therefore would only remark that I perfectly agree with what Colonel Heath mentioned with reference to working with the infantry, and I also cordially agree with what General Leach has just said. At Chatham it is our custom to try and work with the infantry as much as ever we can. This year we were also able to afford some assistance to the general commanding the cavalry brigade at Canterbury. He wanted to carry out some operations connected with the embarkation of his regiments, and through Colonel Heath and his staff we were able to very materially add to the success of the instruction that the general carried out. What I wish to emphasise is that at Chatham it is our great pleasure to mix with the other arms of the Service, and I feel sure that it is to our mutual benefit that we should do so. Colonel Heath is fully aware of the advantages to be gained, and has done everything he can in support.

Major B. St. J. BARTER (Lincolnshire Regiment), *p.s.c.* :—I should like to say a few words in connection with the question of counter-attacks which Colonel Heath has raised. The diagram that he showed us of the force for a counter-attack, centrally placed behind the other troops, is one that is advocated in some text-books; but it is very often possible to have the general reserve placed in some entirely different position, where the counter-attack could be developed much more easily than from a central retired position. For instance, it might perhaps be placed on a flank protected by some natural feature, or it might be placed wide to a flank, in expectation that the enemy's turning attack—which is sure to take place nowadays on one wing or the other—would be delivered on the flank where it is stationed, and that it could, in its turn, take the enemy's flank attack in flank. Or the position might be crescent-shaped, with the main reserve on a flank, so that when the enemy has developed his attack into the centre of the curve, it could come out with much greater ease than from a retired central position. As regards the question of preliminary bombardment, it is at present laid down in "Combined Training" that a demonstration should be made in combination with the bombardment—a principle which appears to be exceedingly wise, because if a demonstration is properly made, the defending troops are tied to their trenches in order that they may return the fire of the demonstrating troops; for the latter may, if their demonstration be completely ignored, make a real attack. In order to keep down the fire of the attackers, the defenders are obliged to expose themselves, and therefore I think the preliminary bombardment should always be combined with this demonstration, which may be turned into a real attack. That in olden times was not considered at all necessary. In these days I think it is. Colonel Heath mentioned that the old digging and surveying class at Chatham had been done away with. I am sorry to hear it; I did not know it had been discontinued. I can testify to the great use that it was to infantry officers in times gone by. They learned there what they could learn nowhere else, and I for one got an education there in field engineering and in topography which has been of extreme use to me throughout my service. I think one or two or more officers in a regiment going to that class come back to their regiments and are able to instruct others, and so a little leaven leavens the whole

lump, and the Army becomes permeated with the teaching of Chatham. I think it is a great pity these classes have been done away with, and if something could be done to give the instruction which was so useful in the past it would be of great advantage to the Service.

Lieut.-Colonel G. M. HEATH :—With regard to a counter-attack, I meant to say that a counter-attack close to the position is not likely to be decisive nowadays, because the attacking general who knows his business will take good care to guard the flanks of his attack; and the containing power of the rifle is so great that a comparatively few well-posted infantry, with perhaps guns to back them up, will be able to keep off that sort of counter-attack for a considerable time. Hence counter-attacks on the defended ground not being contemplated, you can arrange your position purely for passive defence. You can strew obstacles all along it, leaving practically no gaps, because your counter-attacking troops will make a much wider movement than used to be the case.

Colonel S. D. CLEEVE, R.E. :—We have been discussing the question of infantry fire trenches, and whether they should be at the bottom or at the top of a hill. I should like to ask the lecturer to give us his views as to the best position for artillery in relation to the question of the hill-top, and what kind of cover artillery batteries should take up in attack and defence.

Lieut.-Colonel HEATH :—I am rather diffident in expressing an opinion on that subject, but I know that in the early part of the recent war the Russians put their guns high up on crests. In the siege of Port Arthur they put them very high up, and the Japanese did much the same. But as they gained experience both sides adopted indirect fire—the Russians especially. As I said in my lecture, at Shu-Shan-Pu, the Russian guns were firing indirect, and the Japanese never found them at all all the time; they did not know what to fire at. Therefore, I should never use the top of a hill to place my guns on, unless it was absolutely necessary in order to see the country; I should put them on the lower slopes, and, if possible, behind the crest.

The CHAIRMAN (Major-General Sir Reginald C. Hart, V.C., K.C.B., K.C.V.O.) :—I am quite sure that General Leach and Colonel Smith-Rewse expressed the sentiments of the Corps of Royal Engineers when they said that it was their earnest desire to come into closer touch with the other arms of the Service. I think Major Barter has given us very sound views regarding the counter-attack, and the preparatory bombardment, and he also referred to the subject of the abolition of instruction. Having been an instructor myself for many years, I deplore the change of system by which examinations are now very greatly increased and instruction very greatly decreased. If we had more instruction we might have less examination. If you will have patience with me, I would like to make a few remarks on the tactical aspect of the points referred to by Colonel Heath. I think there is no one here who will not admit that the objective of all military operations is to secure possession of certain positions that are of decisive importance; and one of the objects of field engineering is to assist one force to remain in a position and to assist another force to turn it out; and the attacking engineer has almost invariably beaten the defending engineer. We

cannot always turn a strong position. The Japanese had no choice but to attack the fortified positions that barred their way, because there were neither roads nor tracks suitable for a modern Army that would have made it possible to get round a flank. If the brave Japanese had oftener resorted to deliberate systematic approach, making full use of field engineering, instead of going full steam ahead, it may be that they would have spared themselves some severe checks, and the loss of many valuable lives. There is a use for field fortification that we must not overlook, namely, for the sole purpose of delaying the pursuit of a victorious Army, and that is an occasion when an active defence would not further the end in view. Some field works at Leipsic, in 1813, might, to a great extent, have covered the passage of the Elster, and saved the terrible disaster that befel the French Army. There are other occasions when the purely passive defence of field works is the correct procedure. Colonel Heath, in the first notes that he sent me, used these words :—"The object of field fortification is in all cases to minimise men." I know that he is sound in his views, but that statement must be accepted in only a very restricted sense, and it is a very dangerous thing to preach without perhaps a fuller explanation than the lecturer has given I was very glad to find that Colonel Heath afterwards explained that more fully. Some years ago a statesman, at the Chamber of Commerce, pleased his audience very much by referring to the great mountain barriers on our North-west frontier of India, as if they were a substitute for men, which they most certainly are not, and he was as much in error as those wiseacres who a few years ago were certain that we could defend our shores with the new torpedo-boats alone, and that neither battle-ships nor sailors were any longer required. With your permission I will read a few lines that I wrote upwards of six years ago :—"It is one of the great errors made in the use of field works to imagine that fortifications can be made a substitute for men. In only a restricted sense is the statement true; if a position is fortified so that the defenders can inflict heavier losses than they suffer, it requires, of course, fewer men to defend than to attack. The error pointed out has led many to overlook the fact that decisive victory cannot be expected from mere defensive resistance, though the object in view may be best furthered, for the time being, by defensive action, as at Torres Vedras in 1812. Although it is dangerous to regard field fortifications as a substitute for men, they are a means by which the enemy may be delayed, and thereby time saved, pending the arrival of reinforcements or the decisive action of that part of the Army which is making an offensive movement elsewhere. If time and opportunity offer, a rear guard may gain time by means of the protection afforded by field works, and siege works enable an investing Army to hold its positions with far fewer men than would otherwise be possible." Colonel Heath also referred to the question of clearing the front, and he cautioned us not to be in too great a hurry to cut down trees. I should like to remind you of a very good example corroborating what Colonel Heath has stated. It is one that I have often studied, and I have been round the ground with officers who fought there; I refer to the siege of the Residency at Lucknow. I was quite surprised to find how near the mutineers came, and how close they brought their guns; there were so many trees and buildings outside our defences that it was impossible for the mutineers to get a long range for their guns, and when they brought them close to the Residency they came under the effective fire of our marksmen. It is my opinion that if it had not been for the close

nature of the surroundings of the Residency at Lucknow, the enemy's guns, at long ranges, would have pulverised the defences of the Residency. I know that Colonel Heath agrees with me that the troops must not be subservient to the field works, but the works subordinated to the requirements of the troops. The only way to ensure that the tactical relations between the troops and the ground are correct is to choose the ground most suitable for the troops, and then see how field fortifications can assist them to hold it. But the positions easiest to defend are often selected first, and then the unfortunate troops have to fit in as best they can, and frequently they do not and cannot fit in. No doubt in many cases the best positions for the troops coincide with the positions easiest to strengthen with works. I have always strongly deprecated any attempt to make the troops carry portable tools, because it would seriously impair their mobility. If a soldier has to carry a cape it will be of constant use to him, but if he carries a portable tool he may never have occasion to use it. We all remember "Little Alice in Wonderland," and the White Knight whose horse was laden with every conceivable thing, not omitting a bee-hive, because it would be so useful if he met a swarm of bees. It is true that sufficient tools may not be available on the eve of a great battle, but it is a less evil than to overload the men throughout the operations. Colonel Romilly expressed himself so fully and soundly on that point that I do not think I need say anything more. He drew our attention to the great difficulty of knowing what troops will be required to dig. The first line of troops which you send forward to develop the attack may not be required to dig, or only some of them, and, therefore, there is the difficulty of knowing to which troops you should give the tools. If the troops carry tools into action, or if a certain proportion of them do so, they should be full-sized tools, and not the portable ones which try to do two or three things and are never a success—I mean the combined pick and shovel. Regarding counter-attack, I agree with Colonel Heath in not believing much in the stereotyped text book counter-attack, because it overlooks the moral side of the question, and that troops who seek shelter in defensive works possess no mobility, and are already half beaten. If the defenders, as Major Barter said, really contemplate a serious counter-attack, they must deliberately prepare for it beforehand, as Frederick the Great did at Rossbach and Napoleon at Austerlitz, because it cannot be improvised. I am not well up in the tactics of the Battle of Hastings, but I have always understood that the disaster was due in great measure to an unprepared counter-attack. A truly dreadful expression was coined in 1870-71, namely, the "offensive-defensive." The theorist's idea of waiting calmly on the defensive until the assailants are complaisant enough to be repulsed, or to make some frightful mistake, and then to suddenly change from the defensive to the offensive would be a most dangerous game to play, because the vigorous attack of the enemy might upset all those fine plans, as Marshal Tallard's were upset by the vigorous attack of Marlborough at the Battle of Blenheim, and I doubt if anyone present could recall any examples of such a game having brought off a decisive success. In no fairness could Waterloo be considered an example. No, if you are strong enough to attack, you should make a plan of attack, have a settled purpose, and carry it through with resolution, because acting on the defensive is an admission of weakness, and should only be resorted to when the circumstances are so unfavourable as to compel you so to act, and then it is time enough to elaborate a defensive plan that contemplates a counter-attack if a favourable opportunity offers; in

other words, an active defence with local counter-attacks. There can be no doubt that most mediocre generals have a great partiality for the defensive and for being sheltered behind their field fortifications. Frederick and Napoleon both remark upon this. Colonel Heath says:—"Preparation of a second position to cover a possible retreat should not be neglected." I know Colonel Heath to be far too good and practical a soldier to overlook the moral aspect of the case, and I am sure he will agree with me that if there are two positions available—if you are fighting for victory—you should choose the stronger and devote all your energy to strengthening it, and not deliberately prepare a second position in rear, or you will take all the heart out of your men in the forward position, and instead of feeling confident and sure of maintaining their ground, they will be thinking of this position in rear, and the doubt the general must have of being able to hold the forward position. Have we not heard of a general burning his boats? There was a true general who knew how to inspire confidence. Colonel Heath has given us an example of how, if the Russian general had, metaphorically speaking, burned his boats, and had put his men in a position from which they could not have retired into a second position, they would probably have held on and been victorious. I am not talking of rearguard actions; I am talking of when a general is fighting for a victory, and in that case you would not be doing wrong to burn your boats. I do not mean to say, never prepare a position in rear, but treat it lightly compared with the forward position, because if you cannot hold the forward position, you are not likely to hold the retired position with the same troops that have been unable to hold their ground. Nor am I now referring to a series of fortified positions like those that barred the way to the Japanese. Regarding preparations in case of defeat, we must not overlook that a general has no justification for fighting a battle, provided he can avoid it, if he thinks there is a fair chance that he may lose it. Napoleon said that a general should not fight a battle unless he is persuaded that he has rather more than 70 per cent. of the chances in his favour. If he has not these chances, he should manœuvre and bide his time. Sometimes the opposing general is so clever that he makes the other general fight whether he likes it or not. An important consideration is the time to attack field-works. Some prefer night attacks, but it seems to me that we should get as close as we can at night, entrench, and attack in daylight, because everyone can see what he is about, and the covering parties and the guns may keep down the fire of the defenders; this they cannot do at night. Of course, it is often desirable to make attacks on a small scale and rush positions at night, especially if the enemy can be surprised. Attacks in clear moonlight offer many advantages. As Colonel Heath told us, we cannot see more than 200 yards in the brightest moonlight, and I have satisfied myself about it, over and over again. You can see in the immediate foreground well enough to read a letter, but you cannot see the enemy a few yards off. Frederick the Great said that it was better to have too few than too many field-works, because it is not the works that stop the enemy but the troops that defend them. Lycurgus refused to fortify Sparta, because he said:—"That city is well fortified that has a wall of men instead of brick." And Sparta held its own during eight centuries. Colonel Heath mentioned five points on which he invited discussion. I have already spoken of the first and fourth, and on these he has expressed his opinion. But I do not think he has expressed any decided opinions on the second and fifth. I will venture, very briefly, to give my own

opinion on the second, third, and fifth points. An intrenched firing line may be for days, weeks, and even months, in the presence of the enemy, and it appears to me that we have to consider the necessity for rest, and protection from the effects of rain and cold; therefore, not more men should be in the firing line than are necessary, but in case of attack, there should be means for rapidly reinforcing; therefore, they should be in close touch with the supports. If the entrenched firing line is at or near the bottom of a hill, as Colonel Heath has shown us, it might be impossible to reinforce it during an attack, and in that case, perhaps, the best plan would be for the reinforcements to fire over the front line from positions at or near the top of the hill. Because some preparatory bombardments have not been effective is no reason for dispensing with such a preparation, and we know that Napoleon resorted to preparatory bombardment. Surely no one would suggest dispensing with the co-operation of the artillery. I think, however, Colonel Heath referred more to bombardments which go on for a long time, and when there is no attack for some appreciable time after the bombardment. Colonel Barter truly expressed the opinion that it is no use to have a bombardment unless you threaten to do something. Regarding steel shields in the attack, it would not violate a principle of war, but due regard must be paid to mobility. We must not impair the mobility of the troops, but Colonel Heath suggests that they would only be used in a very restricted way. Bullets hitting steel shields would make a very startling noise, and perhaps induce some of the shield bearers to lie down and cover themselves with their shields. I thank you very much for listening to these remarks with such patience. It now only remains for me to thank those gentlemen who have taken part in the discussion, and to express to Colonel Heath our very great obligation to him for his interesting and instructive lecture.

PRIMARY CONDITIONS FOR THE SUCCESS OF CAVALRY IN THE NEXT EUROPEAN WAR.

Lecture given before the Berlin Military Society by Lieut.-General von PELET-NARBONNE.

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Continued from February JOURNAL, p. 224, *and concluded.*

THE Russo-Turkish War of 1877-78 affords food for some reflections of special interest. It was possible to feel quite an excitement at the prospective performances of the Russian cavalry in this campaign, since only a short time before—in September, 1876—great strategical cavalry manœuvres had taken place in Poland; these had been initiated before any other Army had attempted them, and operations on such a scale had never been carried out before or since repeated. They had aroused universal attention, and (according to Russian sources) had been a brilliant success.

By the Imperial orders, the cavalry was given the following problems to solve: "To interrupt the mobilisation of isolated portions of a hostile army; to effect the seizure of lines of railway and points of importance in order either to destroy them or to secure their possession; to cover the mobilisation and railway centres against operations by hostile cavalry; to reconnoitre wide stretches of country as well as special localities and hostile forces; and above all to practise the duties of covering the army and obtaining information."

It was thought that the Russian cavalry would have extracted special value from these manœuvres, and would have made the results of their experience apparent in the next campaign; however, it did not fulfil the expectations which had been formed of it.

Russian writers are their own keenest critics. General Kuropatkin, who was then Chief of the Staff to General Skobelef, gave the following opinion on the performances of the Russian cavalry in September, 1877, when it should have covered the investment of Plevna, and when energetic action was specially desirable[1]:—"In

[1] Kritische Rückblicke auf den Russish-türkischen Krieg von 1877-78, nach aufsätzen von Kuropatkin, bearbeitet von Oberst Krahmer. Berlin, 1889.

conclusion," he writes, "there is only this to be said: that 90 Russian and Roumanian squadrons and sotnias ought to have been masters of the whole of the country round Plevna, with good leadership on one side and on the other the comparatively defective composition of the Turkish cavalry. Our horsemen should, by constant readiness for hand-to-hand fighting, have forced the enemy's Regular cavalry and Circassians to flee whenever they appeared, and should have been invulnerable to the Turkish infantry, had they only avoided becoming involved in a fire action. Had they been quite confident that, in these days as had almost invariably been the case in the past, a bold and resolute attack under favourable conditions upon an infantry detachment on the march, on an escort to a convoy, or by an attack upon the flank or rear, or a surprise attack on an infantry bivouac, would have achieved certain success at a small loss, our cavalry would have developed a great power and have become a valuable source of assistance to the other arms. The least movement of the enemy in the theatre of war would have quickly become known, and the arrival of supplies or reinforcements of any kind have been entirely prevented or seriously hindered. As a matter of fact, our cavalry was not employed to advantage. The duties of reconnaissance were either inefficiently performed or not carried out at all."

In proof of this last statement, Kuropatkin relates several extraordinary instances, and amongst others gives the following:—"After the cavalry of General Loschkaref had reached the Sofia road on September 8th, communication was not established with the cavalry of the left wing either on the 8th, 9th, or 10th, although only a few kilometres separated one force of 34 squadrons from another of 18 sotnias."

As a reason for the small value of the cavalry operations in the days preceding the assault on Plevna, Kuropatkin gives:—"Disinclination of commanders to undertake operations which were well within their powers, but which might bring them in contact with the Turkish infantry, and so run the risk of suffering loss." Later on Kuropatkin speaks of the fundamental mistake which the Russians made in regard to the employment of cavalry. "Many commanders," he says, "believed that with the improvement in firearms the *rôle* of cavalry on the battle-field was played out, so long as victory or defeat yet hung in the balance. They were persuaded that cavalry attacks during an action would be of no value, as they offered no chances of success." Kuropatkin then further adds:—"As of old, so even in these days, a comparatively unimportant though fresh effort, either from our side or that of the enemy, which brings a reserve of cavalry, artillery, or infantry into action, can yet decide the issue. At this decisive moment to hold back the cavalry is absurd, no matter what losses they may suffer. Were even a whole division of cavalry to be sacrificed, this must be endured if, by their annihilation, victory is snatched from the hands of the enemy, or our army is saved from defeat. '*In peace time, cavalry must be educated to live for that sublime moment when such a sacrifice is demanded.*' (We must remember that in war the gaining of time often inclines victory to one side, and that in a successful attack cavalry losses are generally insignificant.)"

Kuropatkin demands, therefore, "during peace a training in self-sacrifice." This can only be done by means of manœuvres, and

here, so far as circumstances allow, must we teach cavalry to charge home. I have nothing to add to Kuropatkin's words; I have already myself said something of the same kind,[1] and would refer to what has been already mentioned in regard to our own experiences in the last war.

In spite of the poor performances and consequent small losses of the cavalry from the enemy's fire, the strength of the 14 cavalry regiments concentrated before Plevna had been reduced by 5,000 horses through the increased strain thrown on outpost duty by the exaggerated precautions against surprise. The troops numbered only 7 and 8 files. In this manner "the costly arm" shrank away without having been of any real use. A weak cavalry force would have completely disappeared from mere attrition, and cavalry should therefore be kept up to a certain strength, so that it may be able on occasion to endure loss.

Only one Russian unit—the Brigade of Cossacks of the Caucasus—distinguished itself in the Balkan campaign, and, as cavalry, engaged the Turkish infantry with success. At Loftcha on September 3rd, 1877, two complete Turkish battalions were entirely dispersed by this brigade, and the enemy were pursued until nightfall. It was here demonstrated what even Cossacks, who are not trained to the charge, can do when attacking infantry.[2] The brigade commander, Colonel Tutolmin, was, however, a distinguished cavalry officer, while the superior commanders, Generals Kryloff and Loschkaref, were, on the other hand, not up to their work. The last-named officer is mentioned by Kuropatkin as having, when ordered on September 21st, to move rapidly to the assistance of Kryloff's corps, only started on the following day, and taken an hour to cover two kilometres, so that when at last he came upon the corps he found it already retiring.

Colonel Baykoff[3] passes the same judgment as Kuropatkin upon the work of the cavalry in this campaign. He says that the idea of cavalry officers, young and old, was:—"What can cavalry do against infantry with the modern rifle? If the cavalry were given a rifle and bayonet, it would be a different matter; but without these, cavalry cannot engage infantry"—and the cavalry acted accordingly. If cavalry met with infantry, it either retired altogether or dismounted to fight on foot. To what an extent this was the case, the expenditure by the cavalry of one and a quarter million rounds of ammunition is the best proof. Things indeed went so far that patrols left their horses behind and marched several versts on foot (in one case it was five). Again, at Tirnova, Russian cavalry of the advance guard were seen

[1] Die Aussichten der Kavallerie im Kampf gegen die Infanterie und die Artillerie. Vortrag, gehalten in der Militärische Gesellschaft zu Berlin am 3 November 1897, von Graf v. Pelet-Narbonne, General Lieutenant z. D. Beiheft zum Militär-Wochenblatt, 1898, 3. Heft.

[2] Die Kaukasische Kasakenbrigade in Balkanfeldzug, 1877-78. Kriegsgeschichtliche Studie von Thilo von Trotha, Berlin, 1894.

[3] Anwendung und Ausführung des Fuss-gefechts der russischen Kavallerie. Auf Grund des Reglements für die Abgesessenen Teile der Kavallerie und der Kasaken vom Jahre, 1884, kritisierend bearbeitet von Baykoff, K. R. Oberst im Generalstabe. Uebersetzt von Trost, Oberlt., Berlin, 1885.

to dismount and form square in order to protect themselves against attack by 300 Turkish horsemen, after which the cavalry fought as infantry. These men had lost all the cavalry spirit, and had developed into inferior mounted infantry—and why? They had been taught everything possible except to charge home! Colonel Baykoff, however, does not fail to appreciate the necessity for arming the cavalry with a good firearm, for he says:—"The cavalry fire-arm should be in no way inferior to that of the infantry, and all future technical improvements in regard to the rifle should be employed by the cavalry." And in another place he remarks:—"It is unquestionably important that the whole of the cavalry has been trained to fight on foot, and armed with a long-range, accurate rifle with bayonet. It may be said that this has untied its hands and increased its independence and freedom"; further, "The long-range magazine rifle gives the initiative much greater value and sets the cavalry free, according to circumstances, either to attack mounted or to receive the enemy with fire from behind cover."

But—and this is Baykoff's proviso—if the dash of the cavalryman is to be maintained, he must not allow himself to get into the way of a faulty and too frequent use of dismounted action. Baykoff, who had many incidents of 1877-78 in his mind, holds that dismounting easily degenerates into an impulse of self-preservation, and for this reason some men take to it more kindly than to a cool daring on horseback—men who wear the cavalry uniform but who do not possess the dashing cavalry spirit.

I agree altogether with the utterances of this Russian writer. We may draw from them the lesson that in arming cavalry with a good fire-arm, care must be taken that the cavalry spirit does not evaporate, and we should therefore stick to the hard and fast rule that cavalry may only dismount when the *terrain* does not admit of their attaining their object mounted, and when their own infantry is not at hand.

The campaign of 1897 between Turkey and Greece offers no occasion for remark, and I turn to the South African War of 1899-1902.

The importance of this war, in relation to the development of tactics, was at first greatly over-rated, and only lately has this been recognised. Especially in regard to cavalry has this turned out to be the case. At first too little account was taken of conditions totally opposed to those found in Europe. The fighting took place on a theatre of war and, so far as the English were concerned, against an enemy, both differing completely from what would be met with in Europe. The experiences gained can therefore only be useful for Colonial wars, and especially for such a one as ours now going on in South-West Africa; but they offer no real reason for making any alteration in European tactics. But still, there are interesting conclusions to be drawn from the course of the campaign, and we find in them confirmation of what we have always held to be correct.

So far as the English cavalry is concerned, it should be borne in mind, in order properly to understand their poor performances in the early part of the war—up to Lord Roberts taking over command — that they had been till then cruelly split up, and were

never commanded or constituted as a body. When, later on, this was changed, and a cavalry division was organised and placed under command of the enterprising General French, the cavalry contributed considerably to the success of the operations—in spite, too, of the grave defects which still clung to them. Whatever was achieved, however, was, in the main, due to the personality of the leader, who must get the credit for it.

The English cavalry had been solely trained to shock action. They performed practically none of the duties of reconnaissance or covering the army; even among the officers an absolute disinclination for this work was apparent. The discipline, too, and interior economy left much to be desired. This was evident from the fact that owing to the careless seat of the men, which was not looked after by their officers, a very large number of horses were galled and rendered unworkable, and horsemastership, which did not appear to be understood, was wholly neglected.

In several cases, where the cavalry might have obtained a brilliant success, they were hindered by the complete exhaustion of the horses, due either to want of forage or to opportunities for watering being either not made use of or not being forthcoming. This latter misfortune—a peculiarity of the theatre of war—will never make itself apparent to the same extent in Europe, and an unfailing water supply is even more important than the issue of sufficient forage. In dismounted fighting the cavalry did little. On February 16th, in the action at Drieput, the dismounted men of two brigades, assisted by mounted infantry and four guns, failed to turn a Boer rear guard of some 100 men out of a good position.

The great defects of this cavalry (which appeared at that time to be the least valuable, as regards training, of the cavalries of the great Powers) could not be remedied even by a man of the energy and enterprise of French; but the campaign again teaches us that cavalry can still play an important part on active service, even when opposed to a redoubtable foe.

In regard to the so-called attack of the cavalry division at Modder River on February 15th, 1900, I cannot attach the same importance to it as is given in Vol. III. of the Kriegsgeschichtlichen Eingelschriften,[1] for the superiority of the cavalry was out of all proportion, since the attack was made against some 900 Boers only, who, with 3 guns, were distributed over a position four kilometres in length, while the attack was prepared for the British by 9 batteries and 2 heavy guns. The casualties—19 killed and wounded, besides 32 horses—were, moreover, particularly small. If, then, to an English officer who rode in the charge, "our chances at first seemed quite hopeless," and who, expressing the general opinion of the other officers, says: "Few of us can come out of it alive," this, to me, is merely a proof of "*to what perverted and harmful ideas the false teaching of troops may lead.*" It is, however, interesting to record that the moral

[1] Kriegsgeschichtliche Einzelschriften heraus gegeben vom grossen Generalstabe, Kriegsgeschichtliche Abtheilung, 1, Heft III. Erfahrungen aussereuropäischer Kriege neuester Zeit. 1. Aus dem sudafrikanischen Kriege, 1899-1902. 2. Operationen unter Lord Roberts bis zur Einnahme von Bloemfontein, Berlin, 1904.

effect of the charging masses of horsemen was a tremendous one upon the hitherto phlegmatic Boers, who had, however, already endured a heavy artillery fire, and that it exercised a depressing influence upon the Boers who were with the laager in rear.

Nevertheless, the resulting relief of Kimberley is a great feather in the cap for the cavalry division, which should then have been in a position to end the campaign had not French, in following a side issue by pursuing the retreating besiegers of Kimberley, broken the cavalry down through great strain without consequent gain, instead of devoting himself to the real object of preventing the escape of Cronje's force. All the same, he succeeded in heading off the Boers on February 17th at Koedoesdrift, and in holding them there with his horse artillery batteries and about 1,000 dismounted men for a whole day until the infantry came up. Since the horses, as an attempt proved, were too done up to charge, the result which led finally to the surrender of Cronje must be ascribed purely to the employment of dismounted action, which was successful here on the defensive, while in the offensive at Drieput, by the same means, nothing was achieved. Once more in the fighting at Paardeburg on the following day the dismounted cavalry again took part and prevented the advance of a hostile force.

On the resumption of the advance on Bloemfontein, after Cronje's surrender, the cavalry was again directed against the line of retreat of the Boers who were still standing their ground. When the position at Poplar Grove was stormed by the English infantry, and the Boer retreat became a rout, French, who was only 5 kilometres away from their line of retreat, could easily have overwhelmed them if his horses—which, in spite of a comparatively long rest after Cronje's surrender, were completely done up—had been able to move forward even at a trot. He was obliged, however, to content himself with following the Boers up slowly, and was not able to keep even a patrol in actual touch with them. Had it been this day possible for the cavalry to strike in the right place, the capture of the last Boer force then in the field, as well as of President Kruger, who accompanied it, would probably have been effected and the war would have been ended considerably earlier.

Owing to there being no hostile cavalry, the work of the English horsemen was much lightened. The Boers—so far as they were mounted—can only be looked on as mounted infantry. Nevertheless, it is worthy of note that a mounted force like that under Delarey, charging, and keeping up a hot fire at the same time, succeeded on March 7th, 1902, at Treebosch, in putting to flight an English force of 1,200 men, including 900 mounted men, under Lord Methuen, and in capturing much booty.

From this consideration of incidents embracing a period of over 90 years, my audience will already have partly drawn their conclusions. It is now necessary to bring all these into line and to select from among the details of modern battle that which seems desirable for our arm. I include general conditions, and not only those of our own home service.

The great importance of the personality of the commander has been repeatedly insisted upon, and I shall therefore not mention it again. The same with regard to the various experiences as to the

need for so training cavalry that they will not shrink from sacrifice. The need, too, for a really strong force of cavalry is apparent.[1]

In regard to organisation, we must cling to the important axiom that effective work in the first line cannot be expected of Landwehr cavalry. The same may be said of Line cavalry, when, through a too high percentage of registered horses, they acquire something of the character of Landwehr cavalry; the efficiency of this arm depends less on men than on horses. In the second rank stands the demand for armament with a long-range, quick-firing rifle to be attached to the rider. It must be sighted to at least 1,800 metres, since the fire-action of cavalry will often be carried on at long rather than at short ranges, as, for instance, in demonstrations, harrying the enemy, forcing the adversary to disclose his plans, etc. Cavalry must therefore be specially trained to the use of long-range sights, in rapidly picking up its target, in judging distance, even when riding at a gallop; but on the other hand, snap-shooting—since there is no time to turn out marksmen—is only in so far valuable that it gives the rider confidence in his weapon. A plentiful supply of cartridges, to be easily drawn from a pouch belt, is an absolute necessity. A bayonet, to be worn on the rider's hip as a short side-arm, is much wanted, in order to give the dismounted fight an offensive character.

Cavalry must be quite at home in the *fire-fight*, and its importance must be emphasised by inspections being regularly made to test their efficiency in this by some high authority, and by care being taken that it is practised by large units. The time for thorough grounding in this can only be arranged when field requirements are constantly kept in mind. Rapid dismounting and formation of firing lines, speedy remounting and forming into groups, mounted work in all kinds of country, so as to be ready to fight dismounted, are all important things to be practised. With all this, the principle must, however, be maintained, that the mounted attack with the *arme blanche* is the main thing for cavalry, and that dismounted action is only to be resorted to when the object cannot be attained on a horse. The more importance is attached to the non-avoidance of the dismounted fight, the more is importance to be laid upon the maintenance of the bold cavalry spirit and of *derring do*. For such the lance, too, will serve—the weapon which I look upon as *the* weapon *par excellence* for attack; the lance which gives the man wielding it in a fight a feeling of superiority over the man with the sword. At the same time, however, I do not deny that the lance is an awkward weapon when men dismount to fight on foot.

Cavalry must be trained to fight both mounted and on foot, to suit their formations to the ground. The uniform of the horseman must be made to conform to the conditions of the fight on foot; high heavy boots are in the way, head-dresses which, like those of cavalry, can be distinguished from a long distance, are unsuitable. Uniforms of conspicuous colours should disappear from the Army on account of the long range of modern fire-arms; showily-dressed regiments will draw upon themselves an enemy's fire sooner than others;

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[1] Compare "Mehr Kavallerie." Ein Mahnruf im Interesse von Deutschlands Landes-verteidigung von v. Pelet-Narbonne, Generallieutenant z. D. mit zwei Karten. Berlin, 1903.

it will be impossible for patrols so clothed to do their work. Reasonable allowance can be made for tradition only when the object for the employment of the arm does not suffer.[1]

The cavalry division of 6 regiments with 24 squadrons has a suitable strength. A reduction below 20 squadrons would so diminish its fighting power that often there would be no force sufficient to perform its most important work. That this organisation is already of advantage in peace time has been so often proved that I refrain from any more allusion to it. Cavalry corps can be evolved as required on mobilisation. I consider as *the most important extension of organisation* for cavalry that they should obtain through their composition and training the *character of absolutely self-contained fighting bodies*, able to maintain an action, unaided, against a force of the three arms, and equipped with all technical appliances to thoroughly perform any work which may be entrusted to them. In the light of this matter of organisation, such mere tactical questions as, for instance, whether the formation for attack be *flügelweise* or *treffenweise*[2] is therefore of small importance.

Twelve horse artillery guns in three batteries are a suitable number for a cavalry division, with, in addition, a machine gun detachment and mounted pioneers with each regiment, viz., a non-commissioned officer and 30 men, distributed among the squadrons, carrying neither lance nor carbine, but only sword and revolver; to be trained entirely as pioneers, and not to be employed on purely cavalry duties. Experience has taught us well enough that pioneers who do not actually accompany the troops are never at hand when wanted—even to follow close in rear is not enough.

All wagons which follow the cavalry with bridging, signalling, or demolition materials, should have the same mobility as the guns; 3 or 4 bicycles accompanying each squadron may, under certain circumstances, materially help to ease and save the horses; there is never likely to be any lack of men who know how to ride them.

To attach a battalion of mounted infantry to the cavalry division would increase greatly its fighting value. I would only suggest that great results might be expected from Jäger battalions mounted on cobs with snaffles only—such as we sent to South-West Africa.

The addition of ordinary infantry, even if they followed on wagons, would be a drag on the cavalry division.

Hitherto we have not succeeded in devising a satisfactory compressed, easily carried forage as an "iron ration" for cases of emergency, by means of which we might be able to sustain our horses, were it only for a few days. It is to be hoped that the experiments which were made soon after the last war have not finally miscarried.

[1] I remember on the day of Sedan seeing right across the wide battle field away to the woods on the Belgian frontier, a partol of the Hussars of the Guard riding at a distance where any differently dressed rider would have been unnoticed. The uniform of our Protectorate troops is an ideal one for even European conditions.

[2] *Flügelweise* is when the G.O.C. the Cavalry Division has ordered one brigade to form the 1st Line, and the other two brigades behind one or both wings of that line, and all initiative as regards distance and intervals is left to the wing commanders. *Treffenweise* is when the brigades are formed into three lines, one behind the other, at regular intervals.

That the cavalry supply wagons must, if they are to fulfil their purpose, be able to move as quickly as the troops, has been already laid down by General von Bernhardi in his "Our Cavalry in Future Wars."[1] I would refer you to it.

The cavalry stands at an important point in its development. By means of the old methods it can no longer satisfactorily perform the work of modern war. For an organisation and training far broader and more elastic than of old, the expensive arm must pay the piper, and then—but then only—will the words of General Carl von Schmidt come true:—"I hope that in future battles one may be able to reckon with cavalry as with infantry divisions."

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[1] Zeite auflage, Berlin, 1903.

A GERMAN COLONIAL CAMPAIGN.

THE OPERATIONS AGAINST THE BONDELSZWARTS AND HERERROS FROM THE BEGINNING OF OCTOBER, 1903, TO 31ST JULY, 1905.

Compiled by the 2nd Bureau of the French General Staff.

Translated, by permission of the French Minister of War, from the *Revue Militaire des Armées Etrangères.*

Continued from February JOURNAL, p. 207, *and concluded.*

THE exhaustion of the troops, after the privations and fatigues of the last few days, as well as the impossibility of discovering on the morning of the 12th the direction taken by the main body of the enemy, prevented an immediate pursuit. It was only on the 13th that the detachments von der Heyde, von Mühlenfels, and Deimling were moved in a column from Hamakari on Omutjatjewa (30 kilometres—18¾ miles). But it was soon seen, as had already been experienced at Otjosasu, in the month of April preceding, that the march in a single column of such strong units could not be prolonged for any length of time. The turf was destroyed and the water resources exhausted, because the Hereros had camped in the region from May to the beginning of July, then after them had come the detachment von Estorff. The column had consequently to be broken up and distributed between the different water points in the Hamakari Valley.[1]

On the 15th August the detachment von Estorff, which also had been set in motion on the 13th in a south-easterly direction, overtook at Omatupa (on the Omuramba) some strong bodies of Hereros and captured from them a number of cattle. Although it was not, however, known that this was the main force of the enemy, it was necessary in any case to prevent them retreating towards the north on Grootfontein and Otawi, or towards the east into a part of the Colonel which was now almost pacified.

[1] Von Löbell's "Jahresberichte der Militärischen Wissenchaften," XXXIth Vol. The Herero Rising, p. 483.

To effect this:—

Colonel Deimling moved with 4 companies and a battery and a half[1] in two columns on Owikokorero, which he reached on the 25th August, after having detached a company to occupy Otjosondu;

Major von Reitzenstein (replacing temporarily Major von Mühlenfels, sick) advanced with 3 companies, 1 battery, a detachment of machine guns, and a half company of Witboïs[2] on Otjekongo, where he arrived on the 25th;

Finally, Major von Estorff, reinforced by a part of the detachment von der Heyde, moved with 5 companies, 2 batteries, 1 detachment of machine guns, and a half company of Bastards[3] on Okosondusu, searching all the country lying between the Omuramba-u-Omatako and the middle Eiseb (Epata).

On the extreme right, one company,[4] reinforced by two machine guns under the orders of Captain von Heydenbreck, was sent on the 28th August from Windhoek to Epukiro; on the 2nd September another company[5] was despatched from the same point towards Oas.

On the extreme left, Lieutenant Volkmann held the fords of the Omuramba, to the east of the Waterberg, with 1 Company,[6] 2 machine guns, and 2 guns.

Captain von Fiedler was left on the Waterberg with 2 companies and 1 battery.[7]

On the 29th, Samuel Maherero and his principal captains were reported to be in force with a large quantity of cattle in the Otjimbinde-Otjomaso-Okowindombo region.

Colonel Deimling was immediately recalled to the Upper Eiseb, which his two columns reached on the 3rd September, at Gobahene and Otjekongo.

At this date the three detachments, Deimling, Reitzenstein, and Estorff, were distributed round the enemy on an enveloping line marked by Gobahene, Otjekongo, Okosondusu, where Lieutenant Volkmann, who had found the region of the middle Omuramba completely free, had come to join Major von Estorff.

The Hereros did not wait the completion of this converging movement. On the 3rd September they attacked Lieutenant Volkmann with a part of their forces, and under cover of this diversion, attempted to slip away with their cattle in the direction of Epukiro, which was still free. They counted without the arrival of Captain von Heydenbreck on the 8th at Epukiro, and without the vigorous

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[1] Companies 1, 2, 3, 4, and 6 of the 2nd Regiment, the 5th Battery, and half the 1st. The 2nd Company being detached to Otjosondu.

[2] Companies 9, 10, and 11, of the 1st Regiment, the 6th Battery, and Dürr detachment of machine guns.

[3] Companies 1, 2, 4, 5, and 7 of the 1st Regiment, the 3rd and 4th Batteries, and Saurma detachment of machine guns.

[4] The 5th Company of the 2nd Regiment, which, on account of the delays in disembarking, was unable to take part in the movement on the Waterberg.

[5] The 7th Company of the 2nd Regiment.

[6] The 3rd Company of the 1st Regiment.

[7] Companies 6 and 8 of the 1st Regiment, and the 2nd Battery.

offensive of Colonel Deimling against Kanduwe, and of Major von Estorff against Owinaua-Naua; turned on all sides, they had to pass into the desert. It was not possible to follow them there before the rainy season.

General von Trotha consequently modified his plan. He resolved to prevent the Hereros from escaping from the desert, and let them perish from exhaustion. It was a conception contrary to that which, at the outbreak of the insurrection, had caused the Glassenapp detachment to be directed towards the eastern limits of the Colony. The duty of this detachment was, as we know, to prevent the Hereros from passing the frontier with their herds. The blockade of the desert, on the contrary, forced them to this. This modification of the initial plan of campaign was due to the decision that it was much more important to subdue the Hereros than to save their cattle. From the day, moreover, when, half voluntarily half by force, they entered the desert, the cattle which remained to them were likely to be so few that the question of taking trouble to preserve them was no longer one for consideration.

Some offensive movements undertaken at the end of September by General von Trotha with the detachments von Estorff, von Mühlenfels and Volkmann up to Nonjata, and by Colonel Deimling with 3 companies and 2 batteries up to Otjimanangombe, gave no results commensurate with the fatigue endured. Beginning with the first days of October, it was considered sufficient to occupy the water points on the western confines of the desert of the Omaheke, and to ensure the efficacy of the blockade by keeping on the move small light columns charged to prevent the Hereros from creeping in small bodies past the posts.

General von Trotha was now in a position to hope that in a short time he would be able to finish with the insurrection, when news of exceptional gravity arrived suddenly at Headquarters. A telegram from Colonel Leutwein[1] announced that the Witboïs, the sworn foes of the Hereros, had revolted in their turn (18th October), and that their Chief, the old Hendrik, whose troops had fought at the Waterberg side by side with the Germans, had solemnly declared war.

After having disarmed all the Hottentot auxiliaries, the Commander-in-Chief, as the most pressing need, withdrew from the blockading troops, 3 companies and a battery and a half,[2] and directed them against the Witboïs; then handing over the direction of the operations in the north to Major von Mühlenfels, he left himself for the south.

At the beginning of November the positions of the German troops between Epukiro and the Omuramba-u-Omatako were as follows:—

The detachment von Humbracht (3 companies, 1 battery, 2 machine guns, and 1 mitrailleuse), between Otjimanangombe and Eware, by Epukiro and Okahandja la Petite;

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[1] Some weeks after this revolt, which was as unexpected and unforeseen as that of the Hereros, Colonel Leutwein was authorised to return to Germany; he transferred the Civil Government to General von Trotha, and embarked on the 27th November for home.

[2] 2nd Company of the 1st Regiment, the 4th and 5th Companies of the 2nd Regiment, the 5th Battery, and half of the 1st Battery.

The detachment von Reitzenstein (3 companies, 2 batteries, 1 detachment of mitrailleuses), between Okowindombo and Okosondusu;

The detachment von Estorff (4 companies, 2 batteries, 1 detachment of mitrailleuses), between Owinaua-Naua and Epata;

The detachment von Fiedler (2 companies, 1 battery, and about sixty of the garrison of Outjo), between Okaundja on the Omuramba, Waterberg, Otawi, and Naidaus;

The detachment Volkmann (1 company, 1 half battery, 2 mitrailleuses), between Otjituo, Grootfontein, and Namutoni.

Before the incessant and determined movements of the small[1] detachments in their pursuit, a number of the Hereros, including Samuel Maharero, the principal insurgent chief, passed into British territory, where they were disarmed. In December the signs of the weakness of the enemy became very evident. Numerous bodies of men, women, and cattle, who had perished from thirst, fatigue, or illness, testified to the misery of the hunted bands.

These circumstances permitted the calling on the blockading troops to send reinforcements to the south, where they were being impatiently expected.

Major von Mühlenfels took advantage of the rainy season to deal a last blow at some small bodies who were still moving, in January, in the neighbourhood of Epukiro, under the orders of the Chiefs William Maharero and Traugott.

Some mobile columns, under the orders of Majors von Estorff and von der Heyde, chased them successively from the region comprised between the Eiseb and the Epukiro, then from a water point situated some 40 kilometres (25 miles) to the south of Kalkfontein, where they were established on the 2nd February.

Some of the insurgents made their submission; the others, with William Maherero and Traugott, disappeared to the east.

After having assured themselves that no body of the enemy were to be found in the country comprised between Otjimanangombe and Gobabis, Majors von Estorff and von der Heyde took up again, at the end of February, the pursuit, with the co-operation of Captain von Hornardt, of the garrison of Gobabis. They pushed as far as Dabis, Korikas, and Rietfontein, the length of the English frontier; everywhere they found the encampments abandoned.

In the first days of March there were no longer any Hereros in the desert of the Omakeke; some had passed into the Kaukau Veldt, into the home of the Ovambos, or into English territory; others had died from their privations in the desert, while many had regained the interior of the Colony. At the end of October, some disorganised bands, without resources, for the most part deprived of their chiefs, who were dead, having made their submission or passed into Bechuanaland, were seeking to return to the territories that they inhabited before the insurrection, by attempting to creep past in small groups through the net of surveillance established by the Germans. They succeeded all the more easily as they had no more cattle.

[1] Detachments of various strength which could not, in any case, exceed a Company and 2 guns, on account of the almost complete absence of water in the desert.

It is impossible to form any idea, even approximately, of the number who thus returned to their original districts, where they kept themselves hid in the brushwood; it was sufficient in any case for the presence round the most populous centres of the Colony of people reduced by the necessity of living to assassination and robbery, to constitute a great danger to the Colonists engaged in work, the convoys, isolated posts, heliographic stations, etc.

The new duty was thus imposed then on the troops of dispersing the groups of plunderers and of re-establishing order—the primordial condition of the revival of economic activity.

At the commencement of March the blockade of the desert was raised, and the troops which had taken part in it were distributed in the different localities to the east of the line Outjo-Windhoek.

At the end of April the forces left in Damaraland, under the orders of Major von Mühlenfels, in order to assure the pacification of the country and the security of the communications, comprised[1]:—

a. A Headquarter Staff;

b. 10 companies of the 1st Regiment, 2 batteries and a half, 2 machine guns, and 2 mitrailleuses;

c. 1 company and 2 depôt batteries;

d. Some technical troops: 2 railway companies, the one for working and the other for construction and repairs[2]; a detachment of field telegraphists; a surveying group, and an electric light detachment for lighting the harbour of Swakopmund;

e. Some *Etappen* and Train troops (3 *Etappen* companies,[3] a provision column, an auxiliary provision column, a sanitary half-convoy);

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[1] The greater part of the Expeditionary Corps was employed in the South of the Colony. The different units distributed, at the end of April, over the different theatres of operations, were as follows:—

1. The Headquarters Staff of the Commander-in-Chief, which included a signalling detachment, and other services;
2. Two Regiments of mounted infantry (the 1st Regiment, 11 Companies strong; the 2nd Regiment, 12 Companies), 2 machine gun detachments;
3. Two groups of artillery (9 Batteries, of which 2 were mountain), 8 machine guns.
4. Some Depôt formations (4 Companies, 2 Batteries);
5. Some Technical troops (2 detachments of Field Telegraphists; 2 Wireless Telegraphy detachments; 2 Electric Light detachments; 1 Railway battalion of 3 Companies, one of which for working, and 2 for contruction; 1 Surveying detachment);
6. Two *Etape* commands, with 4 *Etappen* Companies; 1 Commissariat detachment; artillery, remount, clothing, and camp depôts; Medical Service;
7. Three detachments of 5 provision columns, and 2 auxiliary convoys;
8. A sanitary half-convoy.

[2] On the 18th May, 1905, the line from Swakopmund to Otawi was constructed for 177 kilometres (110¼ miles), up to Onguati, 14 kilometres (8¾ miles) from Karibib.

[3] The Marine battalion had been sent home during March, 1905.

f. Some Services: 1 medical unit, with 3 stations for sick, 3 field hospitals, 7 *Etappen* hospitals, 1 depôt for convalescents, 1 commissariat detachment, and sundry other depôts (remount, artillery, clothing, and camp, and reserve hospital).

The distribution of these different units is indicated on the accompanying map.

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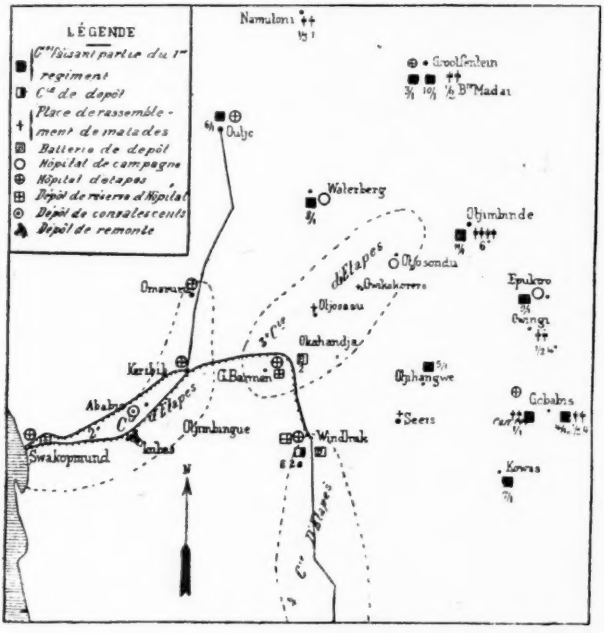
A White Book, dealing with the policy followed in regard to the natives and the Herero rebellion, was laid before the Reichstag at



the time of the discussion of the Budget, 1905, and has given in detail the policy followed in dealing with the natives and the causes of the insurrection. It attributes to the action of the traders and the encroachments of the Colonists only a secondary influence, and traces the real cause of the revolt to the spirit of independence which characterises the Hereros, "to whom the increasing domination of the Germans had become insupportable, and who believed themselves stronger than the whites." The war that they entered upon was for them a veritable war of liberation, in which they did not hesitate to urge upon their hereditary enemies, the Hottentots, to join them—victims like themselves to foreign oppression. "We must expect," wrote Colonel Leutwein, "to see them fight to their last cartridge, then with their assegaies, and check for a long time the development of farming."

More than eighteen months have passed since the insurrection broke out. Successive reinforcements have been sent out to the number, on the 31st July, 1905, of 15,734 men and 13,000 horses; the credits voted by the Reichstag, distributed over the three Budgets for 1903, 1904, and 1905, have risen to the sum of 185,940,950 marks (£9,093,359), and in spite of the expenditure and the efforts which have been made, no one can yet see the end of the campaign. The Hereros have been beaten, but they have not submitted. The Hottentots show no signs of exhaustion,[1] and the Ovambos have not yet risen *en masse*, simply because their territories have up to the present been scrupulously respected; but on several occasions they have shown themselves aggressive, and circumstances will perhaps not permit of deferring indefinitely an expedition against these unsubdued people, who believe themselves unconquerable.

People are asking themselves if, under these circumstances, the strength of the force engaged and the credits voted, which greatly exceed to-day the most pessimistic predictions at the beginning of the campaign, will not prove insufficient. The uneasiness which is manifesting itself in Germany on this subject does not appear exaggerated; it is evident that new sacrifices must be made before complete pacification will permit the South-West African Colony to take up again the course of its normal development.

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[1] The operations against the Hottentots will form the subject of a further study.

THE VON LÖBELL ANNUAL REPORTS ON THE CHANGES AND PROGRESS IN MILITARY MATTERS IN 1904.

Précis from the German by LIEUT.-COLONEL E. GUNTER, *p.s.c.*, (*late*) *East Lancashire Regiment.*

Continued from the February JOURNAL, p. 230, *and concluded.*

The Advance to Liao-yang.

On the 21st June Marshal Oyama was appointed Commander-in-Chief of all the Japanese Armies in Manchuria, with General Baron Kodama, Deputy Chief of the Staff, as his assistant.

The advanced guard of the Ist Army started on the 23rd; its main body on the 24th. On the 30th the 2nd Division and the Guard occupied the pass west of Lianshankwan (Motienling). On the 3rd July the 12th Division occupied the Hsikouling pass, and remained there till the 12th July (25 miles S.E. of Schoyan).

On the 20th June the IInd Army reached Hsingjuetschön, and remained till the 7th July. On the 9th it had a slight engagement with the Russian rear guard at Kaiping, where it remained till the 22nd awaiting the arrival of its 6th Division.

On the 17th July General Count Keller, Commander of the Eastern Detachment, had pushed out a reconnaissance in force to find out if any of the Japanese forces in his front had moved northwards. This led to a desultory Infantry action, not pushed to a close fighting within 800 yards. The Russians could not renew the attack for want of mountain guns, which were indispensable in that hilly country. The Japanese followed them up, but did not seriously engage them again.

On the 22nd and 23rd July the 10th Division and the IInd Army marched on to Tanuschi and Taschikia on the Kiaochau-Liao-yang Railway. The 10th Division took the Panling pass and pushed on to within 8 miles of Shimucheng, N.E. of Haicheng.

On the 24th General Oku shelled the Russian positions at Taschikiao, which the latter evacuated after stubborn fighting, inflicting rather more loss on their assailants than they themselves suffered. Close fighting there was not part of the programme of either commander.

On the 26th July the Japanese occupied Yinkau (Newchang).

On the 31st the 5th Division attacked the Russian position west of Shimucheng, the 10th Division having been steadily pushing the Russian troops back on that place since the 28th July. The Russians retreated in order to Haitschöng (Haicheng).

On the 2nd August the Russians abandoned Haicheng, retreating to Anshanchan, and the next day the Japanese occupied it.

In the north the Ist Army attacked with the bulk of the 2nd Division and the Guards the Russian Eastern Detachment in its position behind the Lanho, and with the 12th Division and part of the 2nd Division the Russian Xth Army Corps in the Inschuling pass (Tsuantsutien). The attack was unsuccessful, but the Russian Commander decided to retire to Anping in the night, as the Eastern Detachment had notified that they were evacuating their position abreast of him. The Eastern Detachment accordingly retired to Tanhochuan. The Japanese followed them up to the west bank of the Lanho.

The losses on both sides were severe, that of the Russians especially so.

During the next three weeks both sides prepared for the struggle for Liao-yang.

The Japanese 5th and 10th Division were now united with the lately landed 2nd Artillery Brigade into a IVth Army, placed under the command of General Count Nodzu.

The Battle of Liao-yang.

Since the fighting at the end of July the Russian Army had taken up the following positions:—

The Ist, IInd, IVth Siberian Army Corps were grouped round Anstanchan, with the IIIrd Siberian (formerly Eastern Detachment) and the Xth Army Corps beyond the Tanho east of the line Tunsinpu-Tanhochuan-Anping. The XVIIth was in Reserve at Liao-yang on both banks of the Taitseho. Flanking Detachments were in the Liao valley and at Pönsihu (Penhsi-ho).

The Japanese Ist Army was to reach the Tanho on the 28th August, and Marshal Oyama decided to attack the Russians about Anshanchan on that day.

On the night of the 25th-26th August, General Kuroki's frontal attack on the IIIrd Siberian and Xth Army Corps (which was reinforced by portions of the XVIIth Russian Army Corps in the course of the fighting) was unsuccessful, but the flank attack against the left wing of the Russian Xth Army Corps near Anping was more fortunate. The Russians were arranging for counter-attack on the 27th, when the Commander-in-Chief ordered the whole to retire to Liaoyang. Their withdrawal over the now swollen river Tanho was a matter of some difficulty. There was much rear-guard fighting. In the course of the 28th August all the Russian corps were, however, drawn up in the positions assigned to them for defence at distances behind the Tanho varying from 10 to 12 kilometres (6 to 8 miles).

Of Kuroki's Army only the Guard Division and the 2nd Division followed them up. The positions reached by the 12th Division on the 28th proved their intention to turn the Russian left north of the Taitseho.

The Report gives an excellent sketch showing the relative positions of the contending Armies on the evening of the 29th August, which

is well worth study in the original, and refers the reader to No. 154 of the "*Militär-Wochenblatt*" of 1904, for the complete text of General Kuropatkin's orders for the following day.

On the 30th part of the Japanese 2nd Division of the Ist Army held the left of the Xth Russian Corps, while the Guard Division attacked its right vigorously. The rest of General Kuroki's Corps began the passage of the Taitseho.

The 10th, 5th, and 3rd Divisions attacked the south front of the Russian positions held by their Xth, IIIrd, and Ist Siberian Army Corps. The 6th and 4th Japanese Divisions were to have turned the Russian right, but these, perceiving their intention, prolonged their right, which opposed the 6th Division, while the Russian Cavalry appear to have checked the 4th Japanese Division, for it did not come into action on the 30th at all, and all the Japanese efforts to pierce the Russian front that day were repulsed on Kuropatkin bringing up his Reserves.

On the 31st August the IInd and IVth Japanese Armies renewed their attacks without important success. Of the Ist Army their 12th Division crossed the Lanho river at Sakan, then took position at Kwang-tun to cover the passage of the half 2nd Division, which took till the 1st September crossing. The Reserve Brigade took Pönsihu, driving the Russians northwards.

The XVIIth Russian Army Corps pushed forward in opposition a Division on the heights E. of Sykwantun. Learning the crossing of the Taitseho by the Japanese, Kuropatkin determined to give up his positions still maintained south of Liao-yang and to concentrate his forces for an overwhelming attack on Kuroki's Army. For this he assembled part of the Ist, the XXth, the XVIIth Army Corps, the Ist and IIIrd and part of the Vth Siberian Army Corps, about 100 Battalions altogether. It took the whole of the 1st September to effect this movement. The Japanese occupied the evacuated positions south of Liao-yang, and bombarded and set on fire its railway station and the Russian quarter.

Kuropatkin's orders for this concentrated counter-attack were not well carried out, and Kuroki, after much fighting, maintained his positions, but was not strong enough without assistance from the IInd and IVth Japanese Armies to deliver any counter-stroke. These latter had up to the 3rd September been unsuccessful in their attacks on the Russian positions.

But on that day Kuropatkin decided to retire on Mukden.

That evening General Sarubrieff began the evacuation of Liao-yang, which lasted all night. By the morning of the 4th the whole Army was assembled on the northern (right) bank of the Taitseho. The Japanese Ist Army only advanced as far as Sachutun; the IInd and IVth Armies occupied Liao-yang.

On the 5th September the Japanese Ist Army pressed forward on the left flank of the retreating Russians and occupied the Yentai coal mines. Its IVth Army crossed the Taitseho, but only got as far as Fönshan, where the railway crosses over the road to Mukden.

The Russian retreat was much hampered by their heavy train, which they had not sent off soon enough; but they were not harassed by the Japanese, and on the 7th September the last of the retreating Army reached the Hunho. Leaving a comparatively strong force there to guard the passage, which was moreover strengthened by field works, and to enable him to resume the offensive when the time

for this came, Kuropatkin withdrew his Army to reorganise it afresh after the late severe fighting.

Port Arthur and the Situation on the Sea till October, 1904.

The first two months of the siege of Port Arthur were taken up in completing the investment of the fortress. This was delayed by the naval sorties from Vladivostok and by mines the Russians had laid down in and about the harbour of Dalny, where the siege material of the Japanese had to be landed. This necessitated cautious work in clearing the harbour, and several small Japanese vessels were lost.

On the 26th July the besieging Army, consisting of 3 Divisions and a Reserve Brigade, began to gain ground to the front, and by the 30th they had taken the Russian advanced positions, which had been pushed forward 17 kilometres (about 11 miles) from the fortress.

On the 9th August they had captured the last of these with the Takushan Hill,† which rendered the position of the Russian ships in harbour precarious. Some ships on both sides took part in the fight, but there was no naval engagement.

The Japanese began the actual attack on the fortress immediately after the capture of the Takushan Ridge.

The strongest land front of the fortress was the east front and the east end of the north front. The north-west front was weaker, having only semi-permanent works defending the salient angle. There were no armour-plated forts, but many redoubts and field works, the ground in front of which was sown with land mines, wire entanglements, and other obstacles.

On the 10th August the Russian Squadron, under Admiral Witthöft, attempted, in accordance with the Tsar's orders, a sortie to get to Vladivostok; but Admiral Togo intercepted him, and he was killed on board the "Tsarevitch" by a 12-inch shell. Three cruisers and 5 torpedo-boats, under Admiral v. Reitzenstein, broke through the Japanese line of cruisers and escaped. The 5 other battle-ships, the cruiser "Pallada," and 3 torpedo-boats were driven back to Port Arthur. The "Tsarevitch" escaped, but was seriously damaged.†† Most of the other vessels that escaped were disarmed in neutral harbours. The cruiser "Novik" was stranded in Korsakoff Bay.

The Vladivostok Squadron had varied successes. It sank 4 transports with troops and destroyed many carrying contraband of war. When the Port Arthur Squadron made its eventful attempt to reach it, the Vladivostok 3 large cruisers (the smaller, "Bogatyr," was damaged), under Admiral Jessen, left that port and reached the Straits of Korea on the 14th August. Vice-Admiral Kamimura, with 8 Japanese cruisers and some torpedo-boats, steamed to meet him. The Russians tried to escape, but the "Rurik" was sunk by its commander, the Japanese rescuing most of the crew. The two others, "Rossia" and the "Gromoboi," succeeded in making their way back to Vladivostok, but with considerable damage and the loss of a third of their crews. As a result of these attempts, the Port Arthur Squadron remained fettered to that fortress; the Vladivostok cruisers remained inactive, awaiting the second (Baltic) Russian Fleet. This long hoped for reinforcement did not leave Libau until the 13th October,

†About 6 miles E. of the harbour.—E.G.

††It escaped to Kiauchau.

in the early part of which month the Japanese had commenced the construction of their siege parallels against Port Arthur.

The Russian Great Counter-stroke in Manchuria.

By this time the Ist Russian Army Corps and the VIth Siberian Army Corps had arrived,† and Kuropatkin had nominally 260 Battalions, 160 Squadrons, and 116 Batteries of Artillery, comprising in all about 293,000 men and 900 guns, though about 30 per cent. should be deducted from the numbers he returned. Now two Armies were formed.

On the 2nd October he issued a long order for an offensive movement on a large scale for the relief of Port Arthur. General Grippenberg had been appointed from Finland Commander of the 2nd Army, while Kuropatkin retained that of the 1st.

On the 5th October this movement began as follows:—

A right flank detachment marched out of the Liao-ho valley towards Siaobeicho (at the junction of the Hunho and Taitseho), under General Kossogowski.

The Vth Siberian Army Corps marched along the right bank of the Hunho on Tshantan, under Lieut.-General Dernbowski.

Along the railway and the Mandarin road the West Army wing, consisting of the XVIIth Army Corps, ¾ of the Xth Army Corps, and a strong force of cavalry, advanced, under command of General Baron Bilderling.

Half of the 31st Infantry Division, under General Man, and the Cossack Cavalry of General Mischenko, marched from Fyndiapu to Santiatsy and Mianpuapu to connect the west wing with the east wing. The east wing intended to outflank the Japanese right, and, consisting of the Ist Army Corps, ½ the IInd Army Corps, the IIIrd Army Corps, ¼ the IVth Siberian Army Corps, and the Siberian Cossack Division, moved, under command of Lieut.-General Baron Stackelberg, across the Hunho above Mukden, by Bianupusu and Kaotaitsy, against the Tumynlin Pass and Pönsihu (Pen-hsi-hu). The Rennenkampf detachment (a mixed Infantry Division) and the Trans-Baikal Cossack Division moved by the Taling Pass, 45 kilometres (28 miles) E. of the Kautulin Pass along both banks of the Taitseho on Pönsihu.

A left flank detachment marched from the Taling Pass on Kiautshang, under Colonel Madribor. As Reserves, the VIth Siberian Army Corps followed the right wing, and ¾ the IVth Siberian Corps and the Ist Army Corps followed in rear of the centre.

The Report narrates in some detail the movements of these different bodies and the fighting, for which there is not space here.

On the 8th the Russian advanced guards reached the Shiliho.

On the 9th Rennenkampf's Cossacks arrived at Pönsihu, but not being supported by infantry could not dislodge the Japanese in position there.

On the 10th the Japanese, hitherto acting defensively, took the offensive on the Shiliho and drove General Bilderling's advanced guard back across that river.

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†The Circum-Baikal Railway had been opened on the 26th September, which much facilitated the transit of reinforcements from Russia.—E.G.

On the 12th General Oku attacked the Russian XVIIth and Xth Army Corps again, and drove them back to the Shaho (10 versts = 6½ miles), taking 22 guns.†

Kuropatkin withdrew his centre to the Shaho on the night of the 13th October, and the next morning the Japanese 3rd Division attacked the Russian Xth Army Corps and took 24 guns.

A general counter-stroke had been planned by the Russian Commander for the 16th, it being intended to try and overwhelm the Japanese left flank.

By the evening the Russians had made some progress, General Putilov, Commander of the 2nd Brigade of the 5th Division of Siberian Rifles, having captured a hill (which the Japanese endeavoured in vain all night to retake) and taken 14 Japanese guns. The attacks and counter-attacks at Shahopu (on the river and rail) were fiercely renewed, until, torrents of rain falling, the ground was turned into a perfect swamp. On the 18th all fighting ceased. The Russians had lost 1,074 officers and 42,612 men; the Japanese 15,879 men.

On the 20th October the Japanese retired from Shahopu itself, which was reoccupied by the Russians. From that date until the beginning of January, 1905, the situation remained practically unchanged, both Armies entrenching themselves carefully in their positions within a short distance of one another.

On the 25th October General Kuropatkin was appointed Commander-in-Chief of all the land and sea forces, vice Alexieff; General Linievitch took command of the 1st Army, General Grippenberg retained that of the 2nd, while a 3rd was formed under command of General Baron Kaulbars, a Cavalry officer.

The Fall of Port Arthur.

Between the 25th October, 1904, and the 2nd November, the Japanese gradually drove the Russians back to their main works, and pushed their own Infantry attack forward until within assaulting distance.

Their losses were so considerable that the IIIrd Army had to be reinforced in November by the 7th Division, which it had been intended to send up to join the Main Army in Manchuria. Many attempts to storm the N.E. front failed, but on the N.W. front the efforts of the 1st Division were crowned with success by the capture of the 203 Metre Hill, as it was called, and the high ridge there.

This enabled them, when their heavy guns were brought up, to destroy the remainder of the Russian war-ships in the harbour. On the N.E. front Lieut.-General Kontratenko was killed. The Commandant, General Stoessel, had always acknowledged the great services rendered throughout the siege by this brave and able officer. Between the 28th and 31st December the Japanese took the Erlungshan and Sungtsushan Forts. This sealed the fate of the north front.

On the 1st January, 1905, General Stoessel offered to surrender the fortress, and on the 2nd the capitulation was signed by him and General Nogi.

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†Two Regiments of Japanese Cavalry had also crossed the Taitseho on the 12th, and with dismounted action had driven back the Russian Infantry at Yüniunsin, E. of Pen-hsi-ho.—E.G.

Among the prisoners of war were 9 General Officers, 4 Admirals, 865 Staff, Commanding, and Field Officers, 17,191 non-commissioned officers and men of the land forces, and 6,300 petty officers and men of the fleet, of whom many were wounded or sick; 15,000 to 16,000 wounded and sick men remained in hospital in Port Arthur. The total loss of the Russians amounted to about 25,000 men, 546 guns, and 35,252 rifles, 82,670 shells, and much powder fell into the hands of the victors. These had lost from 60,000 to 70,000 men. On their taking possession of the fortress they at once began to repair the damage done to the forts. Port Arthur is evidently to become a naval station and a war harbour, while Dalny is eventually to be made a free port.

Most of the Japanese war-ships were sent back to Japan for overhauling and repairs. Vice-Admiral Rojdestvensky was appointed to the command of the second Russian Fleet, which reached Madagascar in December, 1904, and January, 1905, where it lay awaiting the arrival of its third fleet, which left Libau on the 15th February, 1905.

The best accounts of the war are in the "*Militär-Wochenblatt*" and the "*Marinerundschau*," and in "*Taktische und Strategische Lehren der Russisch-Japanischen Krieg*," von Major Löffler. (E. S. Mittler u. Sohn, Berlin.)

NAVAL NOTES.

HOME.—The following are the principal appointments which have been made: Rear-Admiral—F. C. Bridgeman Bridgeman, M.V.O., to be Rear-Admiral in the Mediterranean Fleet. Captains—J. Startin to be Captain Superintendent of Sheerness Dockyard; R. A. Allenby, M.V.O., to "Centurion"; H. F. Oliver, M.V.O., to "Dryad"; C. D. Grenville to "Trafalgar"; F. A. Warden to "Cressy." Commanders — C. H. Hughes-Anslow to "Diamond"; H. W. Grant to "Harrier."

The new first-class armoured cruiser "Donegal" commissioned at Devonport on the 6th February for service in China, where she relieves the first-class protected cruiser "Andromeda," and she left Plymouth on the 15th ult. for her destination. The new river gun-boat "Nightingale" has been sent out to China in sections from Chatham, and is to be commissioned at Shanghai in April for river service on the station; her ship's company are taking passage to Shanghai in the "Donegal."

Statement Explanatory of Navy Estimates, 1906-7.—The Estimates for 1906-7 amount to £31,869,500, as opposed to £33,389,500 for the current year, a reduction of £1,520,000. The method by which this reduction has been obtained is described in one of the Appendices (Estimates Committee) to the Blue Book, "A Statement of Admiralty Policy" (Cd. 2791), issued by my predecessor in November last, anticipating much of that usually made on presentation of the Estimates. The present Estimates are substantially in agreement with the forecast given in that Statement.

The following is the statement relative to new construction during the last 12 months:—

New Construction.

Between 1st April, 1905, and 31st March, 1906, the following ships will have been completed and become available for service:—

3 battleships—"Dominion," "Hindustan," "New Zealand."
8 armoured cruisers—"Antrim," "Argyll," "Carnarvon," "Devonshire," "Hampshire," "Roxburgh," "Black Prince," "Duke of Edinburgh."
1 second-class cruiser—"Encounter."
8 scouts—"Adventure," "Attentive," "Forward," "Foresight," "Pathfinder," "Patrol," "Sentinel," "Skirmisher."
16 destroyers.
13 submarines.
1 floating coal depôt.

On 1st April, 1906, there will be under construction:—

6 battle-ships.
10 armoured cruisers.
12 destroyers (coastal).
5 ,, (ocean-going).
1 destroyer (very fast ocean-going).
1 Royal yacht.
15 submarines and a repair-ship.

It is proposed to begin during the financial year, 1906-7:—
4 armoured vessels.
5 destroyers (ocean-going).
12 ,, (coastal).
12 submarines.

Battle-ships.

The Committee on Designs, mentioned in last year's Statement, considered the various designs, and settled the type of battle-ship to be laid down during the financial year, 1905-6. This battle-ship, "Dreadnought," is being supplied with turbine machinery on the Parsons system, and was laid down at Portsmouth on the 2nd October, 1905, and launched on the 10th February by His Majesty the King. It is hoped that the ship will be put into commission in the beginning of 1907.

The "Lord Nelson" and "Agamemnon," of the 1904-5 programme, which are now under construction on the Tyne and Clyde respectively, have made considerable progress during the year, and it is expected that they will be completed by their contract dates.

The decision to re-arrange the armament in the "Warrior" class has somewhat delayed their completion.

Armoured Cruisers.

The six armoured cruisers of the "Devonshire" class have passed successfully through their trials, and all of them are in commission. They attained an average speed of over 23 knots, and one reached 23·6 knots. They are practically identical in speed and coal endurance with the cruisers of the "Monmouth" class, but are superior in armament and protection.

The "Duke of Edinburgh" has successfully passed through all her trials, and attained a speed of 22·84 knots in rough water and a strong wind on the measured course at Polperro. She has been completed at Pembroke, and was commissioned with a nucleus crew on 20th January, 1906.

The "Black Prince" has also passed through all her principal trials successfully, attaining a speed of 23·65 knots in fine weather on the Polperro course.

The four later ships of the "Duke of Edinburgh" class, which have an auxiliary armament of 7·5-inch instead of 6-inch guns, have all been launched during 1905-6.

The three armoured cruisers of the "Minotaur" class, which were laid down during January and February of 1905, have made good progress.

During the current financial year, contracts have been entered into for the construction of three armoured cruisers, named "Invincible," "Inflexible," "Indomitable." These vessels are to be ready for commission in May, 1908, *i.e.*, within 30 months from the date of ordering.

Scouts.

All the eight vessels of the new "Scout" class have been satisfactorily completed and put into commission. These vessels have fulfilled all the conditions of the designs, and have obtained speeds for 6½ hours' continuous steaming, varying from 25·06 knots to 25·88 knots. The eight vessels have been built from four different designs.

Destroyers.

All the vessels of the "River" class which were under construction at the commencement of the current financial year have been completed and put into commission, making in all 34 vessels of this class now in service.

The strength and sea-going capabilities of this class have been severely tested, and have proved very satisfactory.

The 12 coastal destroyers and the five ocean-going destroyers included in the current year's programme have all been ordered. The former will have a trial speed of 26 knots and the latter of 33 knots. Negotiations in connection with ordering one special ocean-going destroyer of 36 knots trial speed are nearly complete.

The whole of the destroyers included in this year's programme will have turbine machinery, and be fitted for carrying and burning oil fuel.

Other Vessels.

The design of a new yacht for His Majesty has been completed, and the actual building is in hand on the Clyde.

The steam-ship "Indrabarah," now named "Cyclops," has been purchased for conversion into a fleet repair-ship.

Submarines.

The 11 boats in the present year's programme have been ordered.

General.

Improved appliances for cooking, as well as bread bakeries, are being introduced into ships.

Improved sanitary, ventilating, warming, and washing arrangements are also being introduced.

The use of electricity for many purposes on board H.M. ships continues to increase.

Machinery and Boilers.

The policy of fitting complete installations of water-tube boilers in war-ships has been continued, large tube boilers of "Babcock & Wilcox" or "Yarrow" type being fitted in battle-ships and first-class cruisers, and boilers of the small tube type being fitted in scouts and destroyers.

The conditions adopted last year, under which all contractors' machinery trials in new ships were to be carried out under Service conditions, have been applied to all later ships.

The policy of providing reserve sets of auxiliary machinery, etc., has been continued during the past year by the provision of further auxiliary machinery, etc., typical for various classes of ships, and the stock is now practically complete to date. These reserve parts will enable ships to be supplied with replace auxiliary machinery with the least possible delay.

The provision of an adequate supply of fresh water for ships of H.M. Fleet has been under continued consideration. Additional evaporating and distilling plant has been supplied to each battle-ship which was below latest standard in this respect, when coming in hand for large refit.

All new ships are to be supplied with independent machines for ice-making and for cold storage.

Standardization.—The extended policy adopted last year of making the main and auxiliary machinery of ships of the same class interchange-

able as far as possible has been continued, and this plan is being carried out in all later ships, including destroyers.

Electric Generating Machinery.—In consequence of the extension of the application of electric motors for driving auxiliary machinery and for ships' purposes generally where applicable, larger installations of generating machinery are being fitted in vessels under construction, and those on the more modern completed vessels are being increased as the ships are taken in hand for large refit.

Turbine Propelling Machinery.—In view of the satisfactory performances of H.M.S. "Amethyst," fitted with turbine propelling machinery, and of a rapidly increasing number of such installations in ships of the Mercantile Marine, it has been decided to adopt this means of propulsion in all the war-vessels provided for during the present year.

As the result of experience, it has been decided to replace the set of reciprocating machinery fitted in the "Velox" (turbine-propelled torpedo-boat destroyer) for use at low speeds, by turbines adapted for cruising powers.

Liquid Fuel.—The experimental oil fuel establishment at Haslar has been completed, and trials with five of the latest types of water-tube boilers, together with instructional work, are in regular progress there.

The oil fuel installations in the "Mars" and the "Hannibal" are being brought up to date, and, as opportunity affords, oil fuel appliances are being fitted to H.M. ships "Cæsar," "Majestic," "Magnificent," and "Victorious." Installations are also in progress for all the later vessels building and completing.

The torpedo-boat destroyer "Spiteful," fitted to burn oil fuel only, is in commission as an instructional vessel for the training of engine-room complements in the manipulation of oil-burning appliances.

General.

The war-ships, exclusive of torpedo-boats and submarines, launched during the year 1905 with their tonnage, I.H.P., and estimated speed were as follows:—

Great Britain.—First-class battle-ships—"Africa," "Hibernia," of 16,350 tons, 18,000-I.H.P., and 18·5 knots speed. First-class armoured cruisers—"Achilles," "Natal," "Cochrane," "Warrior," of 13,550 tons, 23,500-I.H.P., and 22·5 knots speed. Scouts—"Skirmisher," of 2,940 tons, 17,000-I.H.P., 25 knots speed. Torpedo-boat destroyers—"Colne," "Gala," "Garry," "Ouse," "Swale," of 550 tons, 7,000-I.H.P., and 25·5 knots speed.

Austria-Hungary.—Second-class battle-ship—"Erzherzog Ferdinand Max," of 10,600 tons, 14,000-I.H.P., and 19 knots speed. Torpedo-boat destroyer—"Huszar," of 400 tons, 6,000-I.H.P., and 28 knots speed.

France.—First-class battle-ship—"Liberté," of 14,865 tons, 18,000-I.H.P., and 18 knots speed. First-class armoured cruiser—"Jules Michelet," of 12,570 tons, 29,000-I.H.P., and 23 knots speed. Torpedo-boat destroyers—"Stylet," "Tromblon," of 336 tons, 6,800-I.H.P., and 28 knots speed.

Germany.—First-class battle-ships—"Pommern," "Hannover," of 13,200 tons, 16,000-I.H.P., and 18 knots speed. Third-class cruisers—"Leipsig," "Danzig," "Königsberg," of 3,250 tons, 11,580-I.H.P., and 23 knots speed. Torpedo-boat destroyers—One division of 6 boats.

Italy.—First-class battle-ship—"Napoli," of 12,625 tons, 19,000-I.H.P., and 22 knots speed. Torpedo-boat destroyers—"Olimpia," "Perseo," "Pegaso," of 217 tons, 2,900-I.H.P., and 26 knots speed.

Japan.—First-class battle-ships—"Kashima," "Katori," of 16,650 tons, 16,000-I.H.P., and 18·5 knots speed. First-class armoured cruiser—"Tsukuba," of 13,970 tons, 17,000-I.H.P., and 23 knots speed. Torpedo-boat destroyers—"Uenohi," "Hatsuschimo," "Yayoi," "Ariake," "Fubuke," "Arare," of 386 tons, 5,300-I.H.P., and 29 knots speed.

Russia.—Third-class cruiser—"Tchininetz," of 1,400 tons, 1,400-I.H.P., and 13 knots speed. Torpedo-boat destroyers—"Emir Bucharski," "Dobrowoletz," "Usadnik," "Gaidamak," of 580 tons, 6,500-I.H.P., and 27 knots speed; "Voiskovoi," "Finn," "Ukraina," of 500 tons, 5,200-I.H.P., and 25 knots speed.

Sweden.—Coast-defence battle-ship—"Oscar II.," of 4,270 tons, 9,000-I.H.P., and 18 knots speed.

United States.—First-class battle-ships—"Vermont," "Kansas," "Minnesota," of 17,650 tons, 16,500-I.H.P., and 18 knots speed; "Idaho," "Mississippi," of 13,000 tons, 10,000-I.H.P., and 17 knots speed. First-class armoured cruisers—"Washington," of 14,500 tons, 23,000-I.H.P., and 22 knots speed; "St. Louis," of 9,700 tons, 21,000-I.H.P., and 22 knots speed.

FRANCE.—The following are the principal promotions and appointments which have been made: Capitaines de Vaisseau—C. E. Motet to "Carnot"; M. G. I. De Ramey de Sugny to "Léon Gambetta"; A. L. M. Huguet to "Condé"; A. Rouyer to "Chasseloup-Laubat" and Command of the Newfoundland Fishery Division; P. A. Le Bris to "Pothuau." Capitaines de Frégate—R. O. D'Hespel, A. M. Ytier, E. A. G. Serres, P. J. Darrieus to be Capitaines de Vaisseau; C. V. Ollivier to "Galilée"; A. L. Harel to "Lance" and 2nd Torpedo-boat Flotilla.

The Fishery Protection Division is to consist this year of the second-class cruiser "Chasseloup-Laubat," bearing the broad pennant of Capitaine de Vaisseau A. Rouyer, Commanding the Division, which is to commission at Lorient on the 26th inst.; the third-class cruiser "Lavoisier," which commissioned at Lorient on the 1st inst., and the third-class cruiser "D'Estrées," which is to commission at Rochefort on the 1st April. At the close of the fishery season, the "Chasseloup-Laubat" and the "Lavoisier" will return to Lorient and be placed in the Reserve, while the "D'Estrées" will join the Atlantic Division, where she will replace a sister-ship, the "Troude."

Orders have been received at Lorient from the Minister of Marine to lay down six new first-class torpedo-boats, which will be numbered 347 to 352 inclusive. Their engines are to develop 2,000-I.H.P., giving a speed of 26 knots; they will carry three torpedo-tubes for 18-inch torpedoes, one in the stem and two coupled together on the after part of the deck. The vessels will be constructed at different yards on the Loire.

The English Submarines.—The following interesting article appeared recently in the *Temps*:—

"The *Projet de Budget* for the year 1906, which has been distributed to the members of the Commission de la Marine, indicates the lines of the new programme of construction which is to be completed in 1919.

"This new programme shows that France will then possess and have completed a total of 131 submarines of both offensive and defensive types, the new programme providing for the building of 90, divided into 18 offensive and 72 defensive vessels. It is necessary, however, to remark that many of the submarines built at the present time will in all probability be completely out of date in 1919, consequently a considerably greater number than 90 will actually have to be provided.

"During the same period of 13 years, only 50 torpedo-boats are to be built, showing the importance rightly attributed by the Minister of Marine to endowing France with a sufficient number of the more novel fighting units.

"Having arrived at an epoch when the utility of submarines is acknowledged without exception by all the Navies of the world, it is our duty to consider what progress has been made in this new branch of construction by others, so as to satisfy ourselves that our new boats will not be inferior to those built abroad.

"The country which, with France, stands at the head of the movement is without doubt England, and it will, we think, be interesting to our readers if we give some information as to how that country views the submarine question.

"The first experiments made in France date back to the period, 1886-88, when the 'Gymnote' and 'Gustave Zédé' were constructed; during the next 10 years the subject was studied in all its bearings, and on M. Lockroy, then Minister of Marine, asking for competitive designs, two new vessels, the 'Morse' and 'Narval,' were laid down. Nevertheless, it was really only after 1897-99, the period coinciding with the Fashoda affair, that France, having proved the utility of submarines, constructed the 'Français' and 'Algérien' and four others of the 'Farfadet' type.

"During these 14 years (1886-1900) England apparently gave the question a cold shoulder, though she carefully took note of the five 'Nordenfelt' submarines that were being built at Barrow by the Vickers-Maxim Company, apparently remembering the words of Pitt regarding Fulton's torpedo: 'If this manner of fighting be ever adopted, there will be an end of all men-of-war.' England perhaps hoped that France would give up the idea.

"From 1900, nevertheless, seeing the incessant progress made by France, the British Admiralty seriously took up the submarine question—the arm of the weaker Power, as it was called, perhaps somewhat disdainfully, by Lord Goschen. At this time France possessed 10 submarines, either building or completed.

"The English having decided—we might almost say, having been forced—to add to their Navy a submarine flotilla, endeavoured to make up for lost time, and in their characteristically practical way decided not to construct these vessels in the Government dockyards, but to leave the initiative to private firms with some experience, giving an order to the Barrow works for a boat of the 'Holland' type, directing them only to make sure they were not infringing any patent rights.

"Having been kept informed of the trials made in America during the last 30 years with the 'Holland' type, the Admiralty decided that this class of boat was the most suitable for them to experiment with, and it would appear that the choice was a judicious one, because at the time, the Electric Boat Company, of New York, to which the 'Holland' Boat Company is affiliated, had built no less than 70 submarines of this type, or about double the number of submarines built in France up to the present time.

"In 1900 England gave her first order for 5 'Holland' submarines of 120 tons; in 1901 a new boat of 180 tons was ordered; in 1902 three boats of 200 tons; and in 1904 ten boats of 300 tons (afterwards increased to 350 tons) were ordered. Thus, in the last 5 years we see a total of 28 submarines laid down in England to a total of 38 altogether built in France. This slight superiority on our side is, however, only apparent, for while in France we are undecided between boats of small and large tonnage and speed, a constant advance in both is to be observed in England, where their aim is the construction solely of offensive sea-going submarines.

"From the first 'Holland' boat of 120 tons and 160-H.P., England has advanced to vessels of 350 tons and 850-H.P., while in France the latest submarines of the 'Emeraude' class will only have two engines of 240 effective H.P.

"If, now, we compare the total submarine tonnage ordered in France during the last five years with that ordered in England during the same period we arrive at the following :—

France.

1900, four of 'Sirène' class of 200 tons.
1901, twenty of 'Naïade' class of 68 tons.
And three numbered 'X,' 'Y,' 'Z,' of 200 tons.
1902, two of 'Aigrette' class of 200 tons.
1903, one submersible, 'Oméga,' of 400 tons.
And six submarines of 'Émeraude' class of 400 tons.
1904, two submarines of 'Guêpe' class of 44 tons.
Giving a total of 38 vessels of 6,048 tons, or a mean of 159 tons per vessel.

"The same calculation applied to England gives that country 28 vessels of 6,330 tons, or a mean of 226 tons per vessel, showing a superiority in tonnage of more than 40 per cent. over the French vessels.

"Why is there this difference? Why are the English submarines on an average more than half as big again as ours? The answer given is that it is a question of politics; that as our foreign policy is essentially pacific, our fleet should primarily be charged with the defence of our shores, and that any question of taking the offensive may be left aside for the present. It is this opinion which would appear to be responsible for our heterogeneous flotilla, for the most part defensive and universally condemned by all authorities on the subject. According to the report of M. Charles Bos, out of 58 submarines laid down in France in the last 18 years (1886-1904) only 16 are of the offensive type, representing only 27 per cent. of the total number ordered. As we have seen, England from the first built only submarines for attack, while we in France have taken nearly the opposite course.

"We constantly see it stated in the Press that the French submarine flotilla is superior to all others; is this true? We propose to examine this further in a future article.

(To be continued.)

Précis of M. Charles Bos's Report on the Naval Estimates for 1906 (continued).—The Gun Armament.—As a ship is only a floating gun carriage, it is easy to understand the importance of the question of armament, especially since the Russo-Japanese War has upset the fighting conditions, to meet which the ships of war of European Navies have been constructed.

Fighting no longer commences at 3,000 yards, but at 6,000, 7,000 or 8,000 yards, or even more. Consequently artillery has to be devised whose heavy projectiles will produce the same effect at these long ranges as at 3,000 yards or under. We have, then, to consider in this study for our new ships :—

1. The *Personnel* of the naval artillery officers (construction of guns);
2. The guns and their projectiles;
3. The ammunition stocks;
4. The coast batteries.

With regard to No. 1, M. Bos recalls that in the Committee's Report last year they felt themselves compelled to call attention to the inconveniences arising from the transfer of the marine troops to the Ministry of War, and regretted that nothing had been done to remedy the regrettable situation which had arisen in consequence.

The officers of what was the Marine Artillery have now become, under the Ministry of War, the officers of the Colonial Artillery, and all are destined for service in the Colonies. In their turn on the roster some of them have been placed at the disposal of the Minister of Marine, first for service in the Department of Naval Ordnance, in the Rue Royale, in the arsenals, and *points d'appui* of the fleet, and then for service in the Ruelle Foundry to superintend the construction of naval guns, but only for a limited time, as they were obliged to return to their duties in the Colonies. The regulations on this point are imperative, as the officers depend for their promotion on their Colonial service.

It thus comes about that the Marine Artillery construct the guns which they never work, and that the gunnery officers of the fleet work the guns with the construction of which they have nothing to do. The inconveniences arising from this bastard organisation—or rather from this inorganic state of things—are easily comprehended.

M. Bos then, with his colleagues on the Committee, again put forward their demand for the creation of a corps of Artillery Engineers, to be placed under the control of the Department of Naval Construction, who will make their careers in the service of the Navy, and will obey the instructions coming from those who design and construct the ships of war.

Turning next to the question of the guns, M. Bos points out that mounted on board ships or lying about on the gun-wharves of the dockyards can be seen 42-cm. (16·5-inch), 37-cm. (14·5-inch), 34-cm. (13·3-inch), 30·5-cm. (12-inch), 27·4-cm. (10·8-inch), 24-cm. (9·4-inch), 19·4-cm. (7·6-inch), 16·4-cm. (6·4-inch), 13·8-cm. (5·4-inch), 10-cm. (3·9-inch), and 8·8, 3·3, and 1-pounder guns, and each of these types has in turn three or four different models, such as the 1893, 1896, 1900, and 1902 models.

And in regard to the projectiles it is the same; each model of each type of gun possesses it own special supplies of shells, consequently there are to be seen in store and on the wharves, mountains of projectiles, most of which are unused because they cannot be utilised.

"A large number of the guns," he continues, "as a matter of fact, constructed at the Ruelle Foundry at great cost are obsolete and cannot be used. The projectiles often are the same, because it frequently happens that the new models cannot fire the shells of the guns they are replacing. The desire to do better and always to do better, which seems to be the line followed by the Marine Artillery, has given us an accumulation of *matériel* impossible to use, and only encumbering our dockyards. From the time that one gun which they have designed has given good results, they

hasten to manufacture a number sufficient to arm the new ships, and then they set to work to design another.

"Without doubt it is necessary to steadily progress and not to remain behind other countries; but it would be better to stick for some years to a gun which experience shows gives excellent results, as the English, German, and other nations do, constructing all the calibres necessary for our ships, providing spare ones and the necessary stores of ammunition and projectiles, both for present use and reserve.

"It must be further remembered that the guns mounted in our ships are of different patterns, which may well lead to difficulties at the arsenals when supplying ammunition, and to still more serious blunders when, in time of war, it is necessary to send supplies of ammunition to squadrons cruising at sea.

"It is no use having ships of war if the guns with which they are armed are not superior, or at least equal, to those of foreign Powers with whom we may find ourselves at war. Up to the present it has pleased all the French technical reviews to repeat that our naval guns are superior to the naval guns of all other countries; but is this true? For a certain time our guns, for the same power, have been lighter than similar guns in other Navies, because our gunners have preferred initial velocity to weight of projectile. We shall not criticise this preference. It is certain, as a matter of fact, that a projectile of a relatively inferior weight but discharged with a very high velocity can have, at a certain distance, a greater destructive effect than a projectile weighing more but fired with a less initial velocity. It is advisable, however, to remark that when the English and the Germans constructed heavy guns throwing heavy projectiles with a relatively high initial velocity, we tried to give higher velocities with lighter projectiles. The trajectory of our projectiles was consequently flatter than those of the English or Germans; the initial velocity was better maintained; it was greater, and permitted, further, the penetration of armour.

"But the result of this high initial velocity with light projectiles, in the models 1893-96, is that the powder chamber has been made so long and so little different from the bore of the gun that the projectiles can no longer be loaded with the same facility as formerly."

"As the result of the lessons from the earlier naval battles between Russia and the Japanese, we demanded interchangeable gun mountings, heavy projectiles, lower initial velocities, the suppression of medium artillery, the adoption of a large calibre, and the modification of our small guns, in addition to grouping them in armoured batteries. We pointed our further that the 65-mm. (8-pounder), 47-mm. (3-pounder), and 37-mm. (1-pounder) guns were too weak, and that it might be necessary to even substitute 100-mm. (4-inch) guns for them, and that in any case they must be removed from the tops, as they would infallibly come to grief before the action had lasted many minutes.

"The battle of Tsushima only confirmed the lessons of the previous battles, placing the question of the gun in the fore-front. Battles beginning at long ranges from this time on, it will be necessary only to use heavy guns and heavy projectiles, with a somewhat decreased initial velocity than we have been in the habit of giving to ours. Abroad, this principle has been admitted, and ships are already being built specially designed to resist torpedo attack, and carry only heavy guns and light Q.F. guns. Medium artillery has been condemned.

"It is satisfactory to know that the Minister of Marine, the Director of Naval Artillery, the Chief of the General Staff, and of the Superior Council of the Navy, and finally the Director of Naval Construction are in complete agreement with us.

"We must have the means of striking the enemy hard, and there must be no failure of ammunition:—

1. One type of battle-ship;
2. One type of gun;
3. One type of shell.

The following policy has already been determined on by the Minister of Marine:—

1. Medium artillery to be given up in the battle-ships of the new programme;
2. To retain as the heavy artillery, the 12-inch, 9·4-inch, and 7·6-inch guns;
3. To abolish all cast-iron projectiles;
4. To adopt one type of steel projectile, capped and charged with a high explosive;
5. To increase considerably the weight of the projectiles;
6. To arm the small cruisers with a medium size gun, other than the 6·4-inch (16·4-cm.) and the 5·4-inch (13·8-cm.)—say a 15-cm. gun;
7. To adopt a larger Q.F. gun than the 65-mm. gun—say one of 75-mm.

One observation must here be made. Doubts have been expressed as to whether this new gun, which will fire 15 rounds a minute and throw a 14-pound steel shell, will be sufficiently powerful, and naval officers are asking very plainly for a 3·9-inch (100-mm.) gun; the Germans, it should be noted, are adopting one of 88-mm. But the gunnery authorities are of opinion that the new gun will be more powerful than similar calibre ones in foreign Navies. Its 14-pound projectile will have an initial velocity of 2,800 feet, and should pierce at 1,000 yards a thickness of steel of 4 inches, which is more than either the English or American 12-pounder guns can do.

8. The heavy guns to be mounted solely in pairs in turrets;
9. The small guns to be moved from the tops and placed, with the exception of the 3-pounders, in redoubts.
10. Special mountings for each gun of each calibre to be done away with. In future the mountings of guns of the same calibre will be interchangeable, and can be used in no matter what sort of turret the guns may be mounted.

"These changes mark a very important advance, and the Minister of Marine and his colleagues are to be congratulated upon them.

"The three battle-ships which figure in the Budget and form part of the new programme will be homogeneous. They will carry four 12-inch guns in pairs in turrets and twelve of 9·4-inch guns, also in pairs in turrets; that is, sixteen heavy guns but only of two calibres."

M. Bos then asks whether under these circumstances it would not be better to adopt at once only one calibre for the guns of the new ships. He thinks the 12-inch gun is too heavy, while the 9·4-inch may be, under certain conditions, not heavy enough, and he suggests that the 10·8-inch as an intermediary between the two might be adopted, and that a new model of this gun, to bring it thoroughly up-to-date, should be designed.

In concluding this part of his Report, M. Bos lays stress upon the absolute necessity of the supply of ammunition in the new ships being largely increased, the weakness of the French ships in this essential matter being notorious abroad, and he points out how fatally the Russians were hampered by the shortage of their ammunition supplies, which were fixed on the standard of the French Navy. Some steps have been taken by the present Minister of Marine to increase the reserve stocks of ammunition in the home arsenals, but the Committee hold that much more requires to be done in this direction, especially as regards the foreign bases of the fleet.—*Rapport du Budget Général de l'Exercice, 1906 (Ministère de la Marine).*

(To be continued.)

ITALY.—The following are the principal appointments which have been made:—Vice-Admiral—Bettolo to Command of the 5th Marine Department (Venice). Rear-Admirals—Bettolo to Vice-Admiral; Aubry to Command of Reserve Division; Bianco to be Under-Secretary of State for the Navy; Biotti to Command of Maddalena.—*Gazzetta Ufficiale.*

General.—As has been the case now for many years, progress in the Navy has been slow during 1905. One battle-ship, the "Napoli," has been launched, and there remain under construction the first-class battle-ship "Roma," laid down at Spezia in 1903; and the first-class armoured cruisers "San Marco" and "San Giorgio," both laid down at Castellamare in 1905. Completing afloat are the first-class battle-ships "Regina Elena" and the "Vittorio Emanuele III.," which are to be completed the first in the spring and the second in the autumn of 1907. During the past year the first-class battle-ships "Regina Margharita" and "Benedetto Brin," with the first-class armoured cruiser "Francesco Ferruccio," have been completed for sea and commissioned.

There were further building at the end of last year 30 destroyers; of these 20 are destroyers of a comparatively speaking small displacement, with engines only developing 3,000-I.H.P.; they have been designed by Messrs. Thornycroft, but are being built in Italy: 10 by the Pattison firm at Naples and 10 by the Ordero firm at Genoa. There are, further, 10 large 30-knot destroyers, also designed by Messrs. Thornycroft, building at the Ansaldo Yard at Sestri Ponente, of 350 tons displacement and 7,000-I.H.P., while four others are being constructed by the Schichau firm at Elbing.

A new gun foundry is to be established at Spezia, in which the Vickers firm is taking a leading part; the same firm has also acquired a considerable interest in the Terni and Odero Armour Plate Manufactories. At the end of January, on the Government range at Muggiano, a new 20·3-cm. (8-inch) gun was tried, and passed successfully through the proof; the weight of the steel projectile is 250 lbs., the charge 30·8 lbs. of balistite, and the initial velocity attained, 2,467 feet. Experiments were made at the same time with some new plates, made at the Terni works on the Krupp system, but the results were not satisfactory.

Launch.—The new first-class battle-ship "Napoli" was launched on the 10th September from the Royal dockyard at Castellamare. She is a sister-ship to the "Regina Elena," "Vittorio Emanuele III.," and the "Roma"; the last-named is to be launched this summer, and the four ships will form a powerful homogeneous squadron. Her dimensions are as follows:—Length over all, 474 feet (435 feet between perpendiculars);

beam, 73 feet 6 inches; draught, 25 feet 10 inches, on a displacement of 12,625 tons. Protection is afforded by a complete water-line belt of Terni steel 10 inches thick, tapering to 4 inches at bow and stern; partial belt to main deck over side amidships 8-inch; barbette armour 8-inch, with 6-inch hoods; secondary turrets, 6-inch; bulkheads, 8-inch; armoured deck, 4-inch to 1·5-inch; conning tower, 10-inch; on central battery for 4-inch Q.F. guns, 3-inch. The armament will consist of two 12-inch guns, one forward and one aft, twelve 8-inch Q.F. guns in pairs in turrets, three on each broadside, twelve 4-inch Q.F. guns in central battery, with twelve 3-pounders and 4-submerged torpedo-tubes. The engines are to develop 19,000-I.H.P., giving a speed of 22·5 knots, steam being generated in 22 Babcock and Wilcox water-tube boilers; the coal stowage is 1,000 tons, which can be increased on emergency to 2,000 tons, which will give a radius of action at 12 knots speed of 10,000 miles. Her complement will be 31 officers and 679 men.—*Marine Rundschau* and *Italia Militare e Marina.*

The Naval Estimates for 1905-6.—The Estimates, Ordinary and Extraordinary, for 1905-6 amount to 127,246,962·15 lire (£5,089,878 10s.), as compared with 127,191,083·16 lire (£5,087,643 6s.) voted for last year, showing an increase of 55,878·99 lire (£2,235 3s.).

The Ordinary expenditure shows an increase of 1,370,426·82 lire (£54,817 2s.) in general expenses, and a decrease of 575,268 lire (£23,010 15s.) in the expenses for the Fleet; but in the Extraordinary expenditure there is only a small increase in the general expenditure of 390,170 lire (£15,606 16s.) and a considerable decrease, amounting to 1,131,467·50 lire (£45,258 15s.), in that on the Fleet. There is a small increase of 2,017·77 lire (£80 15s.) in rent of Crown lands used for naval purposes.

ORDINARY ESTIMATES—GENERAL EXPENSES.

	Proposed, 1905-6. Lire.	£	s.	Voted, 1904-5. £	s.
Ministry of Marine - -	2,441,400·00 =	(97,656	0)	61,440	0
Pensions, etc. - - - - -	6,030,000·00	(241,200	0)	233,200	0
Expenditure for the Mercantile Marine - - - - -	9,799,361·32	(391,974	10)	381,372	0
Total - - -	18,270,761·32	(730,830	10)	676,012	0

EXPENDITURE FOR NAVAL SERVICES.

Ships Fitting-out, in Reserve, etc.	6,535,000 =	(261,400	0)	242,800	0
Officers' Corps in the Navy -	3,469,000	(138,760	0)	146,400	0
Naval Engineers, etc. - -	1,333,500	(53,340	0)	54,040	0
Paymasters and Victualling Department - - -	818,000	(32,720	0)	33,160	0
Medical Staff - - - -	684,600	(27,384	0)	27,600	0
Men's Pay - - - - -	12,380,000	(495,200	0)	516,000	0
Gratuities, etc. - - - -	2,100,000	(84,000	0)	95,760	0
Assistant Officials - - -	125,000	(5,000	0)	4,800	0
Technical Civil *Personnel*	1,440,000	(57,600	0)	56,636	12
Minor Dockyard Officials and Staff - - - - -	1,410,000	(56,400	0)	59,572	8
Police - - - - - -	282,000	(11,280	0)	11,280	0
Semaphore and Wireless Telegraphy - - - -	495,000	(19,800	0)	21,880	0

	Proposed, 1905-6 Lire.	£	s.	Voted, 1904-5. £	s.
Personnel of Coast Local Defence	375,400 =	(15,000	0)	14,400	0
Victualling	8,680,000	(347,200	0)	344,000	0
Barracks, Lighting, etc.	207,000	(8,280	0)	8,280	0
Hospital Services	550,000	(22,000	0)	21,920	0
Naval Institute Professors' Salaries	376,115·45	(15,044	12)	12,884	0
Coal and other Heating Material	6,300,000	(252,000	0)	240,000	0
Ships' Commodities	1,700,000	(68,000	0)	68,000	0
Personnel for Building and Fortifications	105,800	(4,232	0)	4,420	0
Hydrographical Services	281,350	(11,254	0)	11,871	16
Law Charges	32,000	(1,280	0)	1,280	0
Transport of Material	118,000	(4,720	0)	5,000	0
Labour and Material for Construction and Maintenance of Fleet and Guns	14,233,000	(569,320	0)	687,481	0
Guns and Torpedoes	2,700,000	(108,000	0)	104,000	0
Material and Labour for Buildings	2,410,000	(96,400	0)	100,000	0
New Construction	22,500,000	(900,000	0)	848,000	0
Fuel, Stores, Dockyard Plant, etc.	6,550,000	(262,000	0)	208,000	0
Salaries of Officials	366,000	(14,640	0)		
Office Expenses and Clerical Salaries	178,000	(7,120	0)		
Rents and Royalties	74,500	(2,920	0)		
Office Expenses, Civil Officials, etc.	36,900	(1,476	0)		
Honorary Distinctions	———	———		600	0
Recreation Squares for Naval Academy, etc.	———	———		2,160	13
Travelling Expenses	———	———		24,615	0
Total	98,845,765·45	(3,953,830	12)	3,976,841	9

EXTRAORDINARY ESTIMATES.—GENERAL EXPENSES.

	Proposed, 1905-6 Lire.	£	s.	Voted, 1904-5. £	s.
Travelling Expenses	410,000 =	(16,400	0)		
Half-Pay, etc.	15,000	(600	0)	1,040	0
Pay for Officers and Officials for Special Duties	———	———		353	4
Total	425,000	(17,000	0)	1,793	4

EXPENDITURE FOR NAVAL SERVICES.

New Construction	2,612,334·55	———		169,652	2
Coast Defence	300,000·00	(12,000	0)	8,000	0
Purchase of Land	600,000·00	(12,000	0)	8,000	0
Total	3,512,334·55	———		185,652	2

SUMMARY.

Ordinary Expenditure.			
General Expenses - - -	18,270,761·32	———	676,012 0
Expenditure for Naval Services	98,845,765·45	———	3,976,841 9
Extraordinary Expenditure.			
General Expenses - - - -	452,000·00	———	1,393 4
Expenditure for Naval Services	3,512,334·55	———	185,752 2
Depreciation of Ships in Commission - - - - -	3,500,000·00	(140,000 0)	140,000 0
Rent of Crown Lands used for Naval purposes - -	2,693,100·83	———	107,643 9
Grand Total -	127,246,962·15	(140,000 0)	5,087,632 4

A sum of 27,143,802 lire (£1,085,752) is demanded for new construction, as compared with £1,032,272 voted for last year, being an increase of £53,480.

It is appropriated as follows :—

For continuation of the following first-class battle-ships: "Vittoria Emanuele," at Castellamare and Naples; "Regina Ellena," at Spezia; "Roma," at Spezia; "Napoli," at Castellamare and Naples. For continuation of a first-class cruiser—10,000 tons—at Castellamare. Commencement of a second-class cruiser—10,000 tons—at Castellamare. Commencement of coast-defence vessel at Venice. Completion of submarine "Glauco," at Venice. Continuation of submarines "Squalo," "Narvalo," "Olaria," and "Tricheo," at Venice. Completion of transports "Bronte" and "Sterope." Continuation of 3 first-class torpedo-boats. Completion of cistern-vessel, and 17 first-class torpedo-boats.—*Stato di Previsione della Spesa di Ministero della Marina.*

MILITARY NOTES.

HOME.—The following are the principal appointments which have been made :—

Colonels—Lieut.-Colonel (local Colonel) F. S. Garratt, C.B., D.S.O., a Brigade Commander in India, is granted the substantive rank of Colonel in the Army. Colonel H. T. W. Hamilton, D.S.O., A.D.C. to the King, to be a Brigadier-General to Command an Infantry Brigade, and is granted the temporary rank of Brigadier-General whilst so employed. Colonel W. R. Birdwood, I.A., is appointed A.D.C. to the King. Colonel H. N. C. Heath, from A.A.G., 4th Division, to be an A.A.G. at Headquarters.

The New German Rifle Bullet.—The following angles of descent are required to complete the range tables in the memorandum on the new German bullet, communicated by the War Office. (See JOURNAL for February, 1905, p. 215) :—

Range.	Angle of descent.	
	L.E.	S.
Yards.	deg. ins.	deg. ins.
1,500	5 22	3 53
2,000	9 56	7 39

Memorandum of the Secretary of State Relating to the Army Estimates for 1906-7 :—

Total Estimates.

The Army Estimates of 1906-7, viewed as a whole, embody no far-reaching change or new departure, but provide the money necessary to carry on the Army on its present footing for another year. I do not desire to attempt the introduction of serious changes in policy without taking full time for their consideration.

The total of the Estimates, £29,796,000, shows a decrease of £17,000 on that of 1905-6; but though the reduction is thus small, considerable economies have had to be effected in order to provide funds for certain minor but important measures as to the necessity of which there is no doubt, and to avoid the large increase arising from the growth of certain charges. Examples of these are :—

	£
Increased cost of Army Reserve - - - -	220,000
Increased charge for stores and clothing, due to the approaching exhaustion of the surplus stocks available from the late war - -	290,000
Increased charge for service of loans - - -	60,000
Increased charge for pensions - - - -	27,000
	597,000

In addition, the assignment to India in 1905-6 of a share of the output of rifles and small-arm ammunition had the effect of relieving Vote 9 of that year of some £185,000, for which in 1906-7 provision has again to be made within the total of Army Estimates. Before, therefore, there could be any question of a reduction of the total, increases to the extent of over £780,000 had to be absorbed.

Establishment and Strength of the Regular Army.

The real reduction in the establishment in 1906-7 is about 5,300 officers and men as explained at p. 4 of the Estimates. The chief causes are the disappearance of the Royal Garrison Regiment, which has now been almost completely disbanded, the reduction of some 1,300 officers and men of the Garrison Artillery at Colonial stations, referred to below, the reduction of the Royal Engineers by one survey company no longer required for the Ordnance Survey, and by about 550 officers and men in consequence of the transfer of submarine defences to naval control, and the disbandment of certain Colonial units from the same cause.

There will be again a double contingent of men passed to the Reserve, viz., the three years' men enlisted in 1903-4, as well as the usual contingent of seven (or eight) years' men under the earlier system; and the strength of the Reserve is expected to rise as high as 122,000 in consequence. With the present term of enlistment of nine years' Colour service in the Infantry, it is not to be expected that this efflux will be altogether balanced by the influx of recruits, and the strength with the Colours at home is not unlikely to fall below establishment; but steps are being taken to maintain the forces in India and the Colonies at their due strength.

It is not intended to proceed further with the formation of a separate branch of the Regular Army for home service with a two years' term of Colour service.

Colonial Garrisons.

Changes in Admiralty requirements have rendered it possible to reduce Colonial garrisons (with the approval of the Committee of Imperial

Defence) by about 3,000 officers and men, in addition to reductions of 10,500 effected in the Estimates of 1905-6. The reductions in 1906-7 include the whole garrisons of Halifax (Nova Scotia) and Esquimalt, the responsibility for the defence of which has been transferred to the Dominion Government in accordance with the announcement made by my predecessor in 1905-6.

With the exception of a few officers and men whose services have been temporarily lent to the Colony, the British garrison of Halifax has been brought home, and that of Esquimalt will follow shortly. The Dominion Government pays the cost of all troops at these stations, retained at the request of the Colony, as from 1st July, 1905.

Medical Establishments.

Provision is made to begin the formation of a Reserve of Civilian Surgeons, with some training in the special requirements of Army Field Hospitals, to be available on mobilisation for service abroad or at home. Steps are also contemplated for providing on mobilisation the necessary numbers of medical subordinates, both fully trained and auxiliary.

Militia.

An experiment will be tried during the winter of 1906-7 with 20 selected Militia battalions, the recruits of which will be drilled for six months, on enlistment, by their own (Militia) officers. In the training season of 1907, these battalions will be trained for six (instead of four) weeks. Moreover, recruits of these battalions will not be allowed to enlist into the Line until they have completed one annual training in addition to six months' recruit drill. The effect of these changes on recruiting, both for the Militia and for the Line, and on the efficiency of the selected battalions, will be carefully watched; and meanwhile no change in Militia establishments is made.

Volunteers.

The Estimate provides for the staff necessary for brigading the whole of the Volunteer Infantry under Brigadiers, who will be responsible throughout the year for the training and inspection of their battalions. Apart from this, no important change in the establishment or conditions of service of the force is proposed for 1906-7. The terms relating to camps will be the same as in 1905, attendance at camp as a condition of efficiency and the limit of minimum numbers for a "Class I." camp continuing in abeyance.

The strength of the force on 1st January last was 241,708, as compared with 245,525 on 1st January, 1905.

Short Rifle.

In accordance with an undertaking given by my predecessor to the House of Commons in the early part of 1905, further trials with the short rifle were made. For this purpose an experimental issue was made to the various commands at home, and reports were called for from India, where the troops were already in possession of the rifle. The reports received from the troops both at home and in India were of such a character as to determine the Army Council to proceed with the manufacture of the short rifle, and its issue to the infantry at home is now proceeding.

A considerable portion of the output of rifles in 1905-6 was allotted to India, but in 1906-7 this will not be the case, and the supply of arms to

troops on the British establishment will be greatly expedited, there being a total increase of £212,000 in the amount provided for this purpose in Vote 9.

It is calculated that by the end of 1906-7 we shall have a sufficient number of the new short rifles to completely re-arm the whole of our Regular troops at home and in the Colonies, together with their Reservists, in addition to a considerable number of reserve arms.

Re-armament of Horse and Field Artillery.

The original programme contemplated the provision of a certain amount of *matériel* for issue to India before the re-armament of the batteries on the home or Colonial establishments. Circumstances, however, arose which brought about a modification of this original arrangement, and during the autumn of 1905 it was decided to suspend the further issue of the new equipments to India and to proceed with the re-armament of certain batteries at home before completing the Indian issues. In pursuance of this decision, issue of the new equipments to batteries at home is now proceeding. In the course of manufacture, certain minor technical difficulties of construction have come to light, as is not unusual in cases where the *matériel* is of a novel and complicated character; but these have now been completely surmounted. Although they were the cause of some delay, it is not anticipated that they will appreciably, if at all, retard the completion of the whole programme by the date originally contemplated.

Submarine Mining.

As announced last year by my predecessor, the responsibility for the submarine defences at all ports at home and abroad has been transferred to the Admiralty, and the mines, with the vessels and gear connected with them, have all been handed over to the Navy.

The relief thus afforded to Army Estimates, in the provision and maintenance of *matériel*, is substantial; but the reduction of *personnel* is not as large as might at first sight seem due. The reason for this is that the Royal Engineer establishments for submarine mining also found the *personnel* for manning the electric lights connected with artillery defence of ports, and owing to the continued increase in the number of these lights without corresponding increase in men, only a small proportion of the so-called submarine mining units have been in recent years appropriated to "aquatic" duties.

Advantage has been taken of the opportunity afforded by the transfer of the mines to consolidate the establishments for the remaining Engineer duties at defended ports (electric lights, telegraphs, telephones, etc.), and owing to this and to the withdrawal of troops from certain Colonial stations, establishments show a net reduction of some 550 Royal Engineers of all ranks, and of some 170 native submarine miners.

The future of the Militia and Volunteer Submarine Mining units is at present under consideration.

Educational Establishments.

Advantage has been taken of vacant rooms at the Royal Military Academy, Woolwich, to accommodate an additional class of "Sandhurst" cadets there, so increasing the supply of officers to the Cavalry and Infantry.

A committee of representatives of the Treasury, Education Department, and War Office has been appointed to consider whether any reduction

can be effected in the number of regimental and garrison schools now maintained, by making use of the schools of local education authorities.

Non-effective Charges.

The Non-effective Votes, as already stated, show an increase of £27,000, owing to the growth of the charges for retired pay of officers and for soldiers' pensions. These votes are now about half a million higher than they were before the war, and their present tendency is upward rather than downward, as the charge for retired pay of officers, which was instituted after the abolition of the purchase system, has not yet reached its full growth; while the effect of the increases in the strength of the Army during the last 20 years, and of the more liberal scales of pension granted in accordance with public sentiment, is also now being felt.

R. B. HALDANE.

2nd March, 1906.

Army Estimates.—The detailed Army Estimates for 1906-7 have been issued as a Parliamentary paper [73], which contains the following abstract of the more important figures, arranged under the various votes :—

Votes. Nos.		Net Estimates		Increase on net Estimates.	Decrease on net Estimates.
		1906-7	1905-6		
	I. – Numbers.	Total Numbers.	Total Numbers.	Numbers.	Numbers.
A	Number of Men on the Home and Colonial Establishments of the Army, exclusive of those serving in India	204,100	221,300	—	17,200
	II.—Ordinary Effective Services.	£	£	£	£
1	Pay, etc., of the Army ...	10,220,000	10,101,000	119,000	—
2	Medical Establishment ;—Pay, etc.	490,000	482,000	8,000	—
3	Militia : Pay, Bounty, etc. ...	819,000	817,000	2,000	—
4	Imperial Yeomanry : Pay and Allowances	423,000	438,000	—	15,000
5	Volunteer Corps : Pay and Allowances	1,244,000	1,220,000	24,000	—
6	Quarterings, Transport, and Remounts...	2,111,000	2,190,000	—	79,000
7	Supplies and Clothing ...	4,492,000	4,630,000	—	138,000
8	Ordnance Department Establishments and General Stores (Ordinary Services)	745,000	808,000	—	63,000
9	Armaments and Engineer Stores (Ordinary Services)	1,386,000	1,306,000	80,000	—
10	Works and Buildings ...	2,353,000	2,330,000	23,000	—
11	Establishments for Military Education	132,000	130,000	2,000	—
12	Miscellaneous Effective Services	77,000	72,000	5,000	—
13	War Office and Army Accounts Department ...	559,000	545,000	14,000	—
	Total Ordinary Effective Services	25,051,000	25,069,000	277,000	295,000

Army Estimates—continued.

	III.—Non-Effective Services.				
14	Non-Effective Charges for Officers, etc.	1,694,000	1,677,000	17,000	—
15	Non-Effective Charges for Men, etc.	1,684,000	1,673,000	11,000	—
16	Civil Superannuation, Compensation, and Compassionate Allowances ...	180,000	181,000	—	1,000
	Total Non-Effective Services	3,558,000	3,531,000	28,000	1,000
	Total Ordinary Services	28,609,000	28,600,000	305,000	296,000
	Net increase on Ordinary Services			£9,000	
	IV.—Extraordinary Services.	£	£	£	£
	Re-armament of Horse and Field Artillery.				
8	General Stores (Harness, Saddlery, etc.)	30,000	30,000	—	—
9	Guns, Carriages, Ammunition, etc.	1,157,000	1,183,000	—	26,000
	Total Extraordinary Services	1,187,000	1,213,000	—	26,000
	Grand Total—Ordinary and Extraordinary Services	(*a*) 29,796,000	29,813,000	305,000	322,000
	Net Decrease on Ordinary and Extraordinary Services			... £17,000	

(*a*) In consequence of a transfer between Army and Civil Service Estimates, in respect of the Emoluments of Officers of the Royal Engineers employed in Civil Departments, the Army Estimates are less by £4,000 than they would otherwise have been, the Vote affected being Vote 1.

NOTE.—The net Expenditure in 1904-5 is not here shown for purposes of comparison, owing to the complete rearrangement of the Votes in 1905-6.

Repayments by Government of India, included as Appropriations in Aid of Army Estimates; other than Stores, etc., issued on Repayment.	1906-7.	1905-6.
	£	£
To meet the Expenditure for Raising and Training Recruits for India	562,700	560,000
For Deferred Pay and Gratuities for Service on the Indian Establishment	102,000	90,000
For Non-Effective Services of the European Army serving in India	947,801	927,188
	1,612,501	1,577,188
Deduct—Contribution from Army Funds towards Cost of Garrison of Aden and Sea Transport	230,000	230,000
	£1,382,501	£1,347,188

R. B. HALDANE.
PORTSMOUTH.
T. R. BUCHANAN.
N. G. LYTTELTON.
C. W. DOUGLAS.
W. G. NICHOLSON.
J. WOLFE MURRAY.

E. W. D. WARD, *Secretary.*

War Office, 5th March, 1906.

ARGENTINE REPUBLIC.—*Musketry and Gymnastic Instructions.* — For several years the Government of the Argentine Republic has been endeavouring to propagate the instruction of musketry in order that every citizen should be a good shot, with a thorough knowledge of the infantry weapon. Under the patronage of the War Department are many associations which devote themselves to the teaching of target practice; the necessary ranges have been established throughout the Republic, and the citizens resort to them for practice. The Government encourages the organisation of shooting societies and the formation of ranges by providing the necessary arms and ammunition on loan, fixing a monthly subsidy, varying in accordance with the importance of the place. The progress of these societies is regulated by a recent decree, and is controlled by a Musketry Board under a field officer, who has various officers under him, for purposes of constant inspections, which are held with the object of investigating if the weapons provided by the Government are properly used, and if the instruction given is in conformity with the regulations laid down for it.

By means of an active propaganda the citizens have been imbued with a taste for musketry, thanks to the efficacious co-operation of the local authorities and of the principal inhabitants of each locality who thus second the action of the Government. The Congress, for its part, annually allots, in the War Budget, a subsidy for the special purpose of covering the expenses of these societies, for the construction of rifle ranges and for the distribution of prizes in the various meetings which take place continually. The ammunition, which is consumed on a vast scale, is gratuitously provided by the Government, with the sole condition that the empty cartridge cases must be returned, which are again loaded. The arsenal workshops work ceaselessly in the manufacture of ammunition in order to keep pace with the expenditure of the societies. Persons charged with instruction on the ranges are Reserve officers or ex-sergeants, corporals, or even private soldiers, who give their services gratuitously. Should certain societies ask for it, instructors are sent them from the Army. The weapon used by the societies is the same as that of the Army, viz., the repeating Mauser rifle, 1891 Argentine Model, with a 7·65-mm. calibre.

The Government action is not merely confined to instruction in the societies; it also enters into the secondary schools; and, lastly, with that object, a decree has been issued rendering instruction in musketry obligatory in these establishments, and at the same time appointing a certain number of Army officers to supervise this instruction.

Amongst the privileges conceded by the law on obligatory military service in the Argentine, is laid down the discharge, when called to the colours, of every conscript who can show a certain proficiency in rifle shooting.

Special attention is also devoted to gymnastics, and with this object every shooting society should be provided with all the necessary gymnastic apparatus, and the Minister of War has recently ordered all regimental commanders to devote themselves to its instruction. All the instructors come from the Special Gymnastic and Fencing School at Buenos Aires.—*La France Militaire.*

AUSTRIA-HUNGARY.—*Measures taken for Maintaining the Effective in Corps Recruited in Hungary.* — As was anticipated (see JOURNAL for January, 1906), the Austro-Hungarian War Department has taken steps to remedy, from the 1st January, 1906, the absence of the 1905 class in corps and Army establishments, which are recruited in the Kingdom of

Hungary. The Imperial and Royal decision of the 15th November last contains the following dispositions:—

1. *Calling out of Ersatz-Reservists.*

Ersatz-Reservists of Hungarian nationality belonging to the 1904 and 1903 recruit classes are called to the colours, in numbers equal to those of the recruits raised in 1904, and so as to maintain a full peace effective, after the liberation of the 1902 class, which passes into the Reserve on the 1st January, 1906. The service will commence on the 27th December, 1905, the day on which those called to the colours should appear before the commanders of recruiting districts. To avoid all difficulties with the civil authorities, the calling-out will be done simultaneously by means of notices posted on all Army buildings and on police barracks, as well as by means of notices sent to individuals interested through the post. The police will, in addition, take advantage of their daily patrolling duty to verify the results obtained by these dispositions.

The following classified in the Ersatz-Reserve are exempt from being called to the colours:—

Candidates for Holy Orders.
Teachers or Candidates for those Duties.
Landed Proprietors.
Supporters of Families.

It therefore only deals with men of "mediocre ability" and "in excess." In the event where, since October, 1905, re-engagements have been contracted by Hungarians, an equal number of Ersatz-Reservists will be immediately discharged, on their arrival, by corps to which the re-engaged men belong.

2. *Replacing of Discharged Cavalrymen.*

As the cavalry do not possess any supplementary reserve, it has been necessary to take special measures to avoid the necessity for retaining with the colours beyond the legal period the class entitled to discharge. Cavalry regiments will receive from infantry regiments, drawn from the same recruiting district, men who have already completed one year's period of service. These men will be taken from those who show the most aptitude for the mounted service, and will include 10 per cent. of candidates for promotion, as well as a certain number of artificers. The total number of infantrymen thus transferred must not exceed 300 for each cavalry regiment. These men will finish their 3 years' service in their new arm. According to the new order, no provision has been made to replace men liable to discharge in the Navy, the transport, and the special departments, which, like the cavalry, possess no supplementary reserve, and which are filled by recruiting for the Common Army.

Changes in the Organisation of the Chief Landwehr Commands.—By decisions recently published in the *Verordnungsblatt*, the Emperor has approved of a certain number of changes in the constitution of the principal Landwehr commands. On the whole, the higher command is organised on the same basis as before, and continues to include the following grades:—

1. The chief command of the Landwehr.
2. Regimental commanders of the Landwehr District.
3. Commanders of Landwehr divisions.
4. Commanders of Landwehr brigades.

The new decision does not alter the duties of the Nos. 1 and 4 authorities. As regards the chief command of the Landwehr, it merely defines its executive duties, and especially regulates the existence of an adjutant-general, of a Chief of the Staff, with the rank of colonel, and of a judge-advocate, appointments which have already been in existence for several years, but which were not officially recognised.

It is especially the duties of the authorities Nos. 2 and 3 which undergo important changes. In Austria the same distribution of districts has been adopted for the Landwehr as for the Common Army. A Landwehr territorial district corresponds to every army corps district of the Common Army, and the army corps commander also commands the Landwehr district. On the other hand, the Landwehr troops, thus attached to each army corps, form a division, having at its head a divisional general, through whom the army corps commander exercises his authority over the Landwehr troops.

Hitherto the duties of the Landwehr divisional commander were appreciably greater than those of divisional commanders of the Common Army; on the other hand, the army corps commander, although having chief authority over the Landwehr division quartered in his district, had not the same complete authority over the troops and departments of that branch of the Service, as over those of the Common Army. As a matter of fact, the Landwehr divisional commander had the supervision of all the Landwehr departments and establishments; the recruiting, commissariat, medical, and judicial departments were all under that officer, who had, consequently, an organised staff. The army corps commander confined himself to the military command of the troops, to the supervision of training, of the preparation for war, and to disciplinary authority. He had only one officer of his staff available to deal with Landwehr affairs. The new rules give to the army corps commander, with regard to the Landwehr troops and establishments, exactly the same powers as he has over similar units of the Common Army, and naturally confers the same powers on Landwehr divisional commanders as held by those of the Common Army. The direction of the Landwehr services and the supervision of its establishments are under the army corps, the staff of which is increased by a section charged with dealing with all Landwehr matters. This section is under the Chief of the Army Corps Staff: it consists of a military office, a commissariat office, a medical, and finally of a technical sub-division. The general commanding the army corps exercises the same functions with regard to the Landwehr as to the other units of the army corps. He is especially concerned with the mobilisation of the Landwehr and of the Landsturm.

The staff of the Landwehr divisional commander is reduced in the same proportion. Its composition has been made precisely similar to that of an infantry division of the Common Army. The Landwehr divisional commander, on the other hand, and in conformity with the general military organisation, is entrusted with the inspection, from an instructional point of view and also as regards its preparation for war, of the artillery regiment of the Common Army attached to his division in the event of war.—*Revue Militaire des Armées Etrangères*, and *La France Militaire*.

United States. — *Report of Inspector-General, U.S.A.* — Brigadier-General George H. Burton, I.G., U.S.A., introduces his annual report with a tribute to the officers of his department, remarking that it gives him pleasure to commend them, "without

exception, for their faithful, zealous, and conscientious performance of the many delicate and important duties entrusted to them—duties that are exacting, and often performed at the expense of great personal discomfort and inconvenience."

General Burton reports that the general condition of the Army as to instruction and efficiency is reasonably satisfactory. Both officers and men appear to be working honestly and faithfully along the lines laid down by the authorities, but their efforts are frequently impeded by obstacles beyond the power of commanding officers to remedy, such as detached service of officers, insufficient coast artillerymen, and the maintaining of one and two company cavalry and infantry posts.

The state of instruction of the cavalry troops at twenty-eight posts in the United States and the Philippines is described as follows:—At sixteen posts, well instructed; at six, satisfactory; at five, progressing satisfactorily or fairly well; and at one, poor. Instruction in swimming horses does not appear to have been given at as many posts as practicable.

The drills of the Field Artillery were satisfactory, and the horses, guns, carriages, implements, and equipment were in good condition. General Burton is of the opinion that two siege batteries should be stationed at the same post. This would insure uniform training and increase the efficiency of the service in many ways. The organisation of two provisional regiments of Field Artillery, as authorised by General Orders, No. 89, War Department, 14th June, 1905, is welcomed as an advance step towards the instruction of this important arm in modern tactical methods.

The Coast Artillery is generally well instructed, and its efficiency is increasing as modern systems of fire control and direction are installed. Instruction in the use of telephones in stations and artillery definition were not satisfactory at several posts. At Fort Monroe the non-commissioned officers throughout the command showed good knowledge of the equipment and its use, but the privates, as a rule, were not so well informed. Infantry drills were generally satisfactory. At five posts the men were not well instructed in the use of the sight on magazine rifles, and were ignorant concerning multi-ball cartridges. It is of paramount importance that legislation be enacted increasing the strength of the Coast Artillery. The separation of the Coast from the Field Artillery is also important. It is unjust to the officer to expect that he can be thoroughly efficient both as a coast and a field artilleryman. The two services have very little in common; but for the most efficient service in either an officer requires different training, different qualifications and characteristics. There is a shortage of officers at every Coast Artillery post.

The state of instruction in the infantry commands, reported at fifty-four posts in the United States and the Philippines, is classified as follows:—At thirty-nine posts, well instructed; at four, satisfactory; at eleven, progressing satisfactorily or fairly well. In all branches of the Service the advantages derived from physical training were evident in the improved physique and set-up of the men. "In the future instruction of infantry," says General Burton, "we should not forget the important results obtained from night attacks and bayonet charges during the late war in Manchuria. Usually they attack at night; if they gain the position, daybreak finds them entrenched, is a lesson in Japanese tactics worth studying."

Noting the growing sentiment in favour of having a Chief of Cavalry and a Chief of Infantry, General Burton remarks: — "These officers

should be appointed upon the recommendation of boards of general officers, from the list of colonels of each arm concerned, to be detailed for a term of four years, and to have the rank, pay, and allowances, while so serving, of a brigadier-general. They should be made under the same conditions as now govern in the case of officers detailed to the special staff corps under the Act of 2nd February, 1901. Both officers should be limited in assistants to one officer, to be taken from their respective corps, thus effectually checking any tendency toward making them bureaus of the War Department. A great step forward has been made and the efficiency of the artillery increased by having a representative in the War Department in the person of the Chief of Artillery. It is fair to presume that similar action taken by the Government for the infantry and the cavalry would meet with like results. It is therefore urgently recommended that the Secretary of War and Chief of Staff consider this subject with a view to early action."

The report of inspectors show that unquestionably the efficiency of the line of the Army is injuriously affected by the absence from their commands of so many officers, especially of those of the rank of captain and field officer. Such a deplorable situation has been brought about by separating officers from their proper commands for all kinds of duty, some of which is not infrequently of a non-professional nature. There are, for instance, seventy-nine colleges in the United States to which officers are detailed by Act of Congress as military professors. It is General Burton's opinion that where details are of such nature as to call for permanent absence from the Army for a given number of years, the deficiency should be met in the same way and manner as such details are provided for in the special staff corps.

The Inspector-General dwells most earnestly upon the injury resulting to the Service from the absenteeism of captains. He illustrates this absenteeism by citing a group consisting of 100 captains of Cavalry, 19 of Field Artillery, 79 of Coast Artillery, and 200 of Infantry. Of this group of 398 captains, 155 (or 38·94 per cent.) were absent from their commands at the date of the last annual inspection. At the same time, seven companies of Cavalry, two of Field Artillery, six of Coast Artillery, and twenty-four of Infantry were commanded by second lieutenants. It is believed that the record of absenteeism as to the 398 captains above considered may be taken as a probable average for the Army as a whole. General Burton makes the following comment:—"The Regulations of the Army, up to within a few years past, contained a paragraph prohibiting the separation of cavalry captains from their troops. The Regulation was not infrequently violated, but this violation never resulted in the partial demoralisation that exists to-day. The cavalry officer who is willing to abandon and thus subject his troop to the resulting injury that such organisation invariably receives by shifting control from one lieutenant to another, invites the assumption that he does not appreciate that pride inherent in the true cavalryman, who feels that the command of a troop, or of a regiment of horse, is the ambition of his life—the prize of fortune—the perfection and training of which is to be neglected for a detail less enviable than as aide to the Commander-in-Chief of the Army and Navy, to the General Staff, the War College, or as Instructor of Cavalry at the U.S. Military Academy and the Cavalry and Field Artillery School. A cavalry officer, therefore, who will seek details other than those above mentioned, should give way to one who would be willing to take charge of the high office vacated by him, and who will esteem it an honour and a pleasure to have such an important command.

For years in the Field Artillery service the position of the captain of a light battery has been so sought after and prized that when once detailed there are but few instances on record where one of these officers has voluntarily given up the command for a detail of lesser magnitude. And why is this so? Because the command is tendered to him to last through efficient service only, whereas the cavalry captain's command is permanent during good behaviour. The abandonment of his command by order of higher authority enables him to remain away as long as his luck for getting details lasts, and at the end of his detail, whether long or short, if still a captain, he has his troop to return to.

"It would be in the interest of good military instruction and discipline if some of the first-class infantry captains, who prefer the cavalry, should be given those commands instead of the officers who are willing to neglect them for other duties. Most lieutenants of five or six years' service can command an infantry company intelligently, but there are few lieutenants of cavalry at the present time who have the knowledge and experience to properly train and care for the equipment of a troop of cavalry. It is believed that a wholesome remedy for the cure of this evil may be found if the War Department will take measures to secure legislation authorising the President to shift or transfer mounted captains from the cavalry to the infantry in case, after due notice, they elect to remain on detached service away from their troops."

The Service schools at Fort Monroe, Fort Riley, and Fort Leavenworth were found in satisfactory condition, as were the garrison schools for officers and men. Speaking of the training of Militia officers at the Infantry and Cavalry School and Staff College, it is recommended that no such officers be sent to Fort Leavenworth until their qualifications for entrance have been proved. It is also recommended that legislation be obtained so as to render it practicable to examine these officers at the military posts most convenient to their places of residence instead of sending them for examination to the Infantry and Cavalry School.

After considering the subject of desertion at great length, General Burton suggests:—"That the first three months of service be simply under a contract covering that period of time, the Government to reserve all pay above 5 dollars per month under said contract. If the applicant elected to sever his relations with the Government he should forfeit the back pay thus reserved. This plan presupposes the retention of all recruits at depôts for ninety days, a place where and a period during which they could and do get better instruction in first principles than they ordinarily receive with their companies. Besides the advantage to the man, it would be a convenience to the Government in that during this probationary period, officers would have an opportunity to judge whether it was advisable to enlist the individual under consideration."

The present system of inspecting schools and colleges where military instruction is given, which places the duty under the direction of division commanders, has not proved satisfactory, and it is recommended that such inspections be directed from the War Department. Another recommendation by General Burton is that at all posts to be occupied for any extended period, arrangements be made for the accommodation of a battalion, whether it be mixed or composed of either cavalry or infantry. —*U.S Army and Navy Journal.*

VENEZUELA.—*The Military Forces.*—The Regular Army consists of 9 infantry battalions, including the Guards' Battalion; 1 artillery battalion; 1 cavalry squadron; and 2 companies of Marine infantry. Each battalion has

6 companies with a strength of 60 men each. In the event of war the Army may be reinforced by the Militia, the effective of which is reckoned at 100,000 men. It may be added that this Militia appears only to exist on paper. According to the Constitution, however, every citizen capable of bearing arms belongs to the Militia from 18 to 50 years of age.

The country is divided into 5 military districts, each being commanded by a general officer. The commanders of the military districts receive their instructions direct from the President. They have each a State secretary and 2 assistants allotted them. The War Department administers the Army; it consists of the War Minister, a Director of War, a Director of the Navy, a Director of Statistics and Accounts, 12 field officers and secretaries. The following are attached to the War Department: the Inspector-General of the Army and the Supreme Council of War, which consists of 15 general officers.

The officers' *personnel* consists of: 4 generals-in-chief, including the President and the War Minister; 28 generals-in-chief nominated by the President; 1,439 generals; 1,462 colonels, 2,302 majors, 3,230 captains, 2,300 lieutenants, and 1,000 ensigns; or altogether, 11,765 officers, although the Regular Army only consists of 4,000 men, in round numbers!

Even admitting that the Militia might be mobilised, there would still be 11 officers to every 100 men. It is true that these numerous officers are merely officers in name; it is an honorary rank they have. A certain number receive pay, and only a few of them really do any duty. The recruiting of the officers is carried out according to the pleasure of the Chief of the State at the moment. The officers of artillery receive a more or less serious instruction at the Artillery Academy.

The training of the Regular Army consists in some very simple drills and in exercises for the handling of arms. Only that of the Guard is carefully carried out. As aiming and musketry drills are entirely lacking, the men do not know how to use their rifles, and generally fire resting the butt on the hip. The artillery is not horsed; it has 30 Krupp 8-cm. field guns and 10 Krupp 6-cm. mountain guns. Both are partially used in the armament of forts.

There is no tactical training, the result being that the military value of the Army is very small. On the other hand, the Venezuelan soldier, who is accustomed to the climate, to fatigue, and all sorts of privations, might be advantageously employed in minor operations, the more so as the nature of the country would render it difficult for an enemy to profit by his tactical superiority. As regards discipline, there is absolutely none even in peace time, the officers themselves being far from disciplined. In war, entire Venezuelan units have been known to go over to the enemy.

As regards the Navy, it has 4 steam-boats, 4 gun-boats, and 1 torpedo-boat. The most important of the steamers, launched in 1898, with a displacement of 1,200 tons, has only 11 12-cm. guns and 4 machine guns as armament.—*Revue du Cercle Militaire.*

NAVAL AND MILITARY CALENDAR.

FEBRUARY, 1906.

6th (T.) H.M.S. "Donegal" commissioned at Devonport for China.
" " H.R.H. the Prince of Wales presented a new Standard to the 6th Dragoon Guards (Carabiniers) at Bangalore, India.
9th (F.) 1st Brigade R.H.A.
" " 10th Brigade R.F.A.
" " 1st Bn. Northumberland Fusiliers } arrived in India from South Africa and Mauritius in the "Soudan."
10th (Sat.) Launch of H.M.S. "Dreadnought" at Portsmouth.
14th (W.) "I" and "L" Batteries R.H.A.
" " 39th Brigade R.F.A. } left England for India in the "Assaye."
15th (M.) H.M.S. "Donegal" left Plymouth for China.
16th (F.) 2nd Bn. Yorkshire Regiment left India for South Africa in the "Soudan."
17th (Sat.) General Linievitch resigned the command of the Russian troops in the Far East.
18th (S.) The Funeral of King Christian IX. of Denmark took place at Roskilde.
19th (M.) H.R.H. Prince Arthur of Connaught arrived at Tokio.
" " 1st Bn. East Yorkshire Regiment arrived in England from India in the "Ionian."
20th (T.) H.R.H. Prince Arthur of Connaught invested the Emperor of Japan with the Insignia of the Order of the Garter.

FOREIGN PERIODICALS.

NAVAL

ARGENTINE REPUBLIC.—*Boletín del Centro Naval.* Buenos Aires: December, 1905.—"Naval Power: National Sovereignty." "Tables for Calculating the Power of Penetration of Armour-piercing Projectiles." "Acclimatisation and Pisciculture: The First Steps in the Country and the Future." "Refrigerating Installations on board Ships" (*continued*). "Coasting Trade and the Mercantile Marine: Treaties and Conventions." "Modern Destroyers." 'The National Coasting Trade." "Naval Notes."

AUSTRIA-HUNGARY.—*Mittheilungen aus dem Gebiete des Seewesens.* No. 3. Pola: March, 1906.—"The Battle of Tsushima." "A New Method for Avoiding Collisions in Foggy Weather." "On the Strategical and Tactical Duties of Submarines." "The Vyvyan-Newitt Range-finder." "The Latest Admiralty Blue-book." "Foreign Naval Notes."

BRAZIL.—*Revista Maritima Brazileira.* Rio de Janeiro: September and October, 1905.—"Argentine Courtesy." "The Education of Officers

in the Japanese Navy : Engineers and Doctors." "Oceanography." "On Motor Boats." "Submarine War." "The Mail-boat 'America.'" "The Explosives Manufactory at Stowmarket."

CHILI.—*Revista de Marina.* Valparaiso.—Has not been received.

FRANCE.—*Revue Maritime.* Paris : January, 1906.—"Destruction of the Frigate 'Mymphe' by Fire in 1757." "Automobile Boats in 1905." "Note on the Question of the Production of Smoke in War-ships." "Explosion Motors and Steam Engines applied to Navigation." "Some General Tactical Principles for a Fleet Action."

Questions Navales: Revue Générale de la Marine. Paris : 10th February, 1906.—"Open Letter to the Reporters of the Budget of the Navy in the Chamber of Deputies and the Senate." "To the Senators and Deputies who are willing to interest themselves in the Reorganisation of our Navy." "The Conclusion of the Discussion on the Mercantile Marine Act." "The Conquest of the Air."

La Marine Française. Paris : January-February, 1906.—"The New French Naval Programme : 1. Its Budgetary Dangers; 2. The Uselessness of the Increase of the Armoured Fleet; 3. The Utility of the Programme of the Metallurgical Syndicates." "Reply to the *Siècle.*" "The Budget Commission against the Naval Saint-Maixent." "The Naval Abyss." "The Workmen's Question in the Navy."

Le Yacht. Paris: 3rd February, 1906.—"International Tonnage." "Yachting Notes." "The English Petrol Torpedo-boat." "The Mercantile Marine in Parliament." 10th February.—"The Recruiting of the Men of the Fleet." "Yachting Notes." "Constitution and Distribution of our Home Naval Forces in Times of Peace." "The Mercantile Marine in Parliament" (*continued*). 17th February.—"The Decree of the 29th January reorganising the Torpedo Flotillas." "Yachting Notes." "The Evolution of the Marine Motor." "The Mercantile Marine in Parliament" (*continued*). 24th February.—"The New Fleet: The Battleships." "Yachting Notes." "The Mercantile Marine in Parliament" (*continued*).

Le Moniteur de la Flotte. Paris : 10th February, 1906.—"The Torpedo Flotillas." "The Navy in Parliament." "The Torpedo and Submarine Flotillas." 17th February.—"The German Navy." "The Navy in Parliament." "The Torpedo and Submarine Flotillas." 24th February.—"The Law of Concentration." "Naval Artillery." "The Navy in Parliament." "Torpedo and Submarine Flotillas."

GERMANY.—*Marine Rundschau.* Berlin : March, 1906.—"Nelson and the Battle of Trafalgar." "Heat and Combustion Motors." "Medical Lessons of the Russo-Japanese War." "The Raising of the Russian Ships at Port Arthur and Chemulpo by the Japanese." "The Importance of the Moral Element in Fleet and Army." "The Year's Report of the U.S. Navy." "German Industries in China and their Prospects." "Foreign Naval Notes."

ITALY.—*Rivista Marittima.* Rome : February, 1906.—"Some Considerations on Naval Firing." "The Reform of the Mercantile Marine

Code." "Recent Studies on the Variation of the Dip of the Sea Horizon." "Modern Naval Constructions."

PORTUGAL. — *Revista Portugueza, Colonial e Maritima.* Lisbon: January, 1906.—"The Port of Lourenço Marques." "Naval Education in England." "Reorganisation of the English Squadrons." "Angola." "Naval Notes."

Annaes Do Club Militar Naval. Lisbon: December, 1905.—"The Russo-Japanese War." "On the Organisation of the Seamen of the Fleet." "The New Mail Steamers of the Cunard Company." "Launch of the Gun-boat 'Infante D'Manuel.'" "Foreign Notes."

SPAIN.—*Revista General de Marina.* Madrid: February, 1906.—"About Fighting Ships." "The Battle of Trafalgar." "A new Powerful 15-cm. Gun." "Submarines." "Influence of Age on the Capacity of the Senior Officers of the Navy." "English Naval Policy."

MILITARY.

ARGENTINE REPUBLIC.—*Revista del Boletin Militar del Ministerio de Guerra.* Buenos Aires: January, 1906.—Has not been received.

AUSTRIA-HUNGARY.—*Danzer's Armee-Zeitung.* Vienna: 1st February, 1906.—"Re-armament of our Field Artillery and the Hungarian Crisis." "Austria and Italy in the Adriatic." "Qualification Lists." "An Automatic Safety Contrivance for Fire-arms." 8th February.—"More Pioneer Troops." "The Two Days' Naval Battle in the Straits of Korea." "A New War Game Plan." "The Modern Development of the Laboratory for the Direction of Military Medical Remedies." 15th February.—"Military and Civil Pensions." "The Field Artillery in the Manchurian Theatre of War." "Military Surgery." "Military Motors." 22nd February.—"Infantry Reflections on the Battles in South Africa and the Far East." "The Two Days' Naval Battle in the Straits of Korea" (*concluded*). "On the Question of Field Service Clothing and Equipment." "Heavy Artillery of a Field Army and its Development."

Organder Militärwissenschaftlichen Vereine. Vienna. Vol LXXII. Part 2, 1906.—"The Fighting Definitions of the new French Drill Regulations." "Technical Experiences from the Russo-Japanese War." "Preparation for War."

Streffleurs Osterreichische Militärische Zeitschrift. Vienna: January, 1906.—"Field-Marshal Auton Gatgótzy." "History of the War of Liberation, 1813-1815." "The Campaign in Yemen and the Expedition to Nedjd, 1904-05." "The Italian Infantry." "The French Infantry Musketry Regulations." "Tactical Problems for Staff Aspirants." "The Russo-Japanese War." "Intelligence from Foreign Armies."

February, 1906.—"Napoleon's Danube Flotilla, 1805, 1809." "The Narrow-gauge Field Howitzers at the Manœuvres in Southern Tyrol." "The New German Infantry Musketry Regulations." "The German Colonial Battles in 1905." "Tactical Problems for Staff Aspirants." "Italian Mountain Troops." "The Russo-Japanese War" (*continued*). "Military Impressions of the Manchurian Theatre of War." "Intelligence from Foreign Armies."

Mittheilungen über Gegenstände des Artillerie- und Genie-Wesens. Vienna: February, 1906.—"Dimensions of the Prize Target for a given Number of Hits." "Advanced Field Positions in Siege Warfare." "The Automatic Loading Infantry Rifle System *v.* the Mannlicher, M. 1904."

BELGIUM.—*Bulletin de la Presse et de la Bibliographie Militaires.* Brussels: 31st January, 1906.—"French Musketry Regulations of the 31st August, 1905" (*continued*). "Landings."

15th February, 1906. — "French Musketry Regulations of the 31st August, 1905" (*continued*). "Landings" (*continued*). "The Battle of Tsu-Shima and the Naval Lessons of the Russo-Japanese War." "Table of the War and Naval Budgets of the Principal European Military Powers for 1905." 28th February.—Has not been received.

FRANCE.—*Revue du Cercle Militaire.* Paris: 3rd February, 1906.—"Shooting Societies." 10th February.—"Report on the War Budget for 1906." "Some Lessons of the Russo-Japanese War: Infantry Fire." "Shooting Societies" (*continued*). 17th February.—"Some Lessons of the Russo-Japanese War: Infantry Fire" (*concluded*). "Report on the War Budget for 1906" (*concluded*). "Shooting Societies" (*continued*). "Medical Statistics of the French Army for 1903." 24th February.—"A 75-mm. Battery under German Artillery Fire." "The Military Forces of Venezuela." "Shooting Societies" (*continued*). "Medical Statistics of the French Army for 1903" (*concluded*).

Le Spectateur Militaire. Paris: 1st February, 1906.—"Personal Recollections of Verdy du Vernois: 1870-71" "The Russo-Turkish Campaign of 1877-78" (*continued*). "The Army an Educator by means of Reciprocity" (*concluded*). "Japanese Field Service Regulations." 15th February.—"Personal Recollections of Verdy du Vernois" (*continued*). "The Russo-Japanese War" (*continued*). "The Russo-Turkish Campaign of 1877-78" (*continued*). "Japanese Field Service Regulations" (*continued*).

Revue de Cavalerie. Paris: January, 1906.—"General Donop." "Conditions for Success of Cavalry in the next European War." "To Right and to Left" (*concluded*). "Covering Duty during the Eastern Campaign, 1870-71" (*concluded*). "A Point of View on the Evolution of Ideas in the Cavalry during the 19th Century."

February, 1906.—"Equestrian Questions." "Rapid and Endurance Marches of a Detachment of Scouts." "Letters to Plok" (*continued*). "The Short Period of Service and Cavalry Preparation for War" (*continued*). "The Jump of a Ridden Horse."

Revue Militaire des Armées Etrangères. Paris: February, 1906.—"The German Imperial Manœuvres of 1905." "The Russian Army after the Campaign of 1904-05." "Observations on the Russo-Japanese War."

Revue du Genie Militaire. Paris: January, 1906.—"The Siege of Port Arthur." "The Present Tendencies of Sappers in the Russian Army." "Grainte-Asphalte and Armoured Asphalte."

February, 1906.—Has not been received.

Revue du Service de l'Intendance Militaire. Paris: January, 1906.—"Methods for the Checking of Army Accounts." "Elementary Introduction to the Study of Industrial Electricity." "Eatable Earths."

February, 1906.—Has not been received.

Revue d'Artillerie. Paris : January, 1906.—"Russian Field Artillery *Matériel*, Mod. 1900." "Talks on Artillery Tactics." "Practical Attempt at Barrack Improvement."

February, 1906.—Has not been received.

Journal des Sciences Militaire. Paris: February, 1906.—Has not been received.

Revue d'Histoire. Paris: February, 1906.—"The Campaign of 1794 with the Army of the North" (*continued*). "The Pursuit of the English Army by Marshal Soult" (*concluded*). "The War of 1870-71: The Army of Chalons" (*continued*).

GERMANY.—*Militär-Wochenblatt.* Berlin: 1st February, 1906.—"The New English Field Service Regulations and Musketry Instructions." "Russian Troops in the Insurrection in the Baltic Province." 3rd February.—"Once more the Battle of Mukden." "New English Field Service Regulations and Musketry Instructions" (*concluded*). 6th February.—"The Influence of Theatres of War Separated by a Boundary Line on the Character of Operations." "Once more the Fight against Shield-protected Batteries." 8th February.—"On Cyclist Troops." "The Influence of Theatres of War Separated by a Boundary Line on the Character of Operations" (*concluded*). "Once more Gunnery Practice at Balloons." 10th February.—"Beningsen and Wrede, 1813." "The Alcohol Question in the Army." "The Subduing of the Internal Unrest in Russia." 13th February.—"A Military Journal." "The Chinese Grand Autumn Manœuvres in 1905." "Beningsen and Wrede, 1813" (*continued*). 15th February.—"Book by a German Officer on the Combatants in the War in Manchuria." "France's Sahara Companies." "Beningsen and Wrede, 1813" (*concluded*). "Reorganisation of Military Education in the United States." 17th February.—"A Regimental History." "Results of the Barrel-recoiling Gun of the Field Artillery." "On the Battle of Beaune la Rolande." 20th February.—"South-West Africa." "On the Drill Regulations." "Intelligence from the Russian Army." 22nd February.—"On the Influence of Moltke's previously prepared Strategy on the Commencement of the Wars of 1866 and 1870." "Intelligence from the Belgian Army." "Maintenance of Survivors." 24th February.—"The Orenburg-Taschkent Railway and its Importance." "On the Influence of Moltke's previously prepared Strategy on the Commencement of the Wars of 1866 and 1870" (*concluded*). 27th February.—"Training of the Soldier." "From the Annual Report of the War Minister of the United States."

Internationale Revue über die gesamten Armeen und Flotten. Dresden: February, 1906.—"Military and Naval Intelligence from Austria-Hungary, China, France, Germany, Great Britain, Italy, Japan, Roumania, Russia, Sweden, Switzerland, Servia, Turkey, and the United States." *Supplement 70.*—"Some Facts regarding the Artillery in the Russo-Japanese War." *Supplement 71.*—"Horse Resources of the World and their Qualification for Military Service. *French Supplement 83.*—"Importance of Railways for the Conduct of War." "The Turbine Question in the various Navies." "General von Moltke: His Method of Preparing Operations and of putting them into Practice." "The Red Cross in the Russo-Japanese War." "Fire Efficiency in Position Warfare."

Jahrbücher für du Deutsche Armee und Marine. Berlin: February, 1906.—"Napoleon, Moltke, and the Fortress." "On the Infantry

Attack." "The Influence on Ill-treatment of Officers' Inspections." "The Battle of Sandepu." "Winter Manœuvres." "Determination of the Characteristic Greatness of the Trajectory by means of Photography."

Neue Militärische Blatter. Berlin: January, 1906. No. 1.—"A Retrospect of the Past Year." "What does the Personality of Frederick the Great teach the Officer with regard to his individual Military Training?" (*concluded*). "The Present Military Situation on the Indian North-West Frontier." "Definite Adoption of the 'Kokotovic' Universal Sight for Machine Guns in the Swiss Army." No. 2.—"A Retrospect of the Past Year." "French Scheme for Landing Allied English Troops on the West Coast of Schleswig-Holstein." "The Chinese Navy." "The 18,000-ton Battle-ship and the Policy of Naval Construction." "Japanese Espionage during the Russo-Japanese War." "Over Loss in Men, and Soldierly Cleanliness." "Military Echoes." "Military Intelligence."

February, 1906.—Has not been received.

ITALY.—*Rivista di Artiglieria e Genio.* Rome: December, 1905.—"Firing and Tactical Instruction for Field and Horse Artillery." "An Italian Division at the Siege of Colberg (1807)." "The Prop of a Simple Trestle, Unsupported, that is to say, at Intermediate Points." "Portable Douche Baths." "The Walls of Modena" (*concluded*).

Rivista Militare Italiana. Rome: February, 1906.—"Social Legislation." "The Country and the Army." "The Campaign against the Hereros." "Agriculture in the Army." "The Officers of To-day." "L'Armée Nouvelle, ce qu'elle pense, ce qu'elle veut."

MEXICO.—*Revista del Ejercito y Marina.* Mexico: February, 1906.—Has not been received.

PORTUGAL.—*Revista de Engenheria Militar.* Lisbon: December, 1905.—Has not been received.

Revista de Infanteria. Lisbon: February, 1906.—"The Evolution of Infantry Tactics." "Two Words on the Future Campaign against the Cuanhamas and Quamateris." "The Infantry Arm." "Tactical Problems." "Pan-Germanicism and a Military Alliance of the Latin Powers."

RUSSIA.—*Voïennyï Sbórnik.* St. Petersburg: February, 1906.—Has not been received.

SPAIN.—*Memorial de Ingeniéros del Ejército.* Madrid: January, 1906.—"Some Observations on Firing against Balloons." "The Rebellion in German South-West Africa: Some Data relative to the Service of Communications during the Campaign." "The Original Electrical Light." "The Philanthropic Association of the Engineers of the Army."

Revista Técnica de Infantería y Caballería. Madrid: 1st February, 1906.—"General the Marquis de la Romana." "National Defence: The Crisis of Fortification according to General Langlois." "The Cavalry and Musketry Instruction." "The Intellectual Military Year in Spain." "The Machine Gun with Cavalry." "Old Officers in Command in France." "The Island of Teneriffe." 15th February.—

"General the Marquis de la Romana." "National Defence: Heavy Field Artillery; by General Langlois." "Military Operations by Night." "The Island of Teneriffe." "The Machine Gun with Cavalry." "The French and German Fleets."

Revista Científico-Militar y Biblioteca Militar. Barcelona: February, 1906.—"The New Elements in War and the General Instruction of the Army." "Influence of Command on the Operations of Cavalry." "Some Lessons from the Last War."

SWITZERLAND.—*Revue Militaire Suisse.* Lausanne: February, 1906.—"Manœuvres of the IInd Army Corps in 1905." "The Modern Field Howitzer." "Infantry Musketry."

UNITED STATES.—*Journal of the United States Artillery.* Fort Monroe, Va.: November-December, 1905.—"A Contribution to Interior Ballistics." "The Employment of Rapid-fire Artillery in the Field" (*translated from the "Revue d'Artillerie"*). "Range Corrections for Wind." "Professional Notes."

January-February, 1906.—Has not been received.

The United Service. New York: January-February, 1906.—Has not been received.

NOTICES OF BOOKS.

Military Operations and Maritime Preponderance: Their Relations and Interdependence. By Colonel C. E. CALLWELL. London: William Blackwood & Sons.

This work is extraordinarily complete, and perhaps therein—ungracious as it may seem to say so—lies its chief, indeed its only, fault, for those who need most sorely the enlightenment to be gained from a study of its pages, are probably just those who will be most unwilling to seek instruction from a work of such magnitude.

"The soldiers of a great maritime Empire, the territories of which are scattered all over the globe, must understand the broad principles of the art of naval war ere they can appreciate the problems of its defence. The *personnel* of a Navy which may have to shepherd armies over the seas in time of danger, to set them ashore and to minister to their wants when ashore, will not perform its duties the less effectively if it realises the difficulties, the limitations, and the purposes of operations on land." That the officers of both Services study each their own profession with ever-increasing diligence is to-day happily unquestioned; that each of them know as much as they ought about the others' business is open to doubt; and it is possible that the serious differences of opinion between naval and military experts over fundamental questions of defence policy arise from the fact that "each only understands one side of the case in which they are unwittingly acting as opposing counsel rather than as judicial arbitrators." The text, then, of Colonel Callwell's book is, that while sea power in war time is greatly dependent upon the support of military force, the action of armies is often subservient to and only justified by the existence of a dominant Navy. By ships of war, by and of them-

selves, decisive results cannot be gained, while overpowering armies may be prevented from acting where they could do best service, through the preponderating sea power of the opponent.

That sea power and military force are dependent the one upon the other is shown upon every page of Colonel Callwell's book, and supported by an extraordinary wealth of examples from the history of the past. There can be no gainsaying or disputing the truth of the author's remark, that "the ability of amphibious force to inflict grave injury upon the foe is usually immense. The capabilities of purely naval force to cause the adversary damage is often very limited."

Upon the subject of naval bases, Colonel Callwell has much to say that is very sound; the multiplication of fixed defences he rightly dubs "a vicious military policy," but he declares that every port necessary for the maintenance and replenishment of a fleet should be able to hold out for a time and be independent of that fleet. And in the mention of our wonderful chain of naval bases round the world, the writer takes the opportunity of bringing forward again the argument of his book—the interdependence of fleets and armies. "Did these precious possessions," he says, "fall into our hands by accident or by right of conquest? And if they are ours in virtue of operations of war, were those operations purely naval? Halifax and Bermuda and Esquimalt were gained by peaceful settlement; Hong Kong was ceded by China after the first China war; Singapore was relinquished by arrangement with a local rajah; but what of the others? Jamaica was captured by a military force under Venables; St. Lucia fell to a military expedition; Malta was taken after a prolonged siege; Colombo is ours by right of conquest from the Dutch; Simon's Bay was secured by a conjoint military and naval undertaking; Mauritius was captured by an army despatched expressly for the purpose. In every case the operation was founded upon sea power; but it was a military operation for all that."

For the Nation there are several lessons to be learnt from the evidence set before us. Bacon says: "He that commands the sea is at great liberty, and may take as much and as little of the war as he will," from which we may understand that by reason of our naval supremacy we ought to be able to choose the theatre of war and force an opponent to fight upon the ground that best suits us. Another lesson may be learnt from the following three quotations: 1. "In estimating the influence of maritime preponderance over land campaigns, care must be taken not to exaggerate its power while realising its possibilities." 2. "There is a dangerous idea prevalent in this country that because a dominating Navy is the best safeguard for its security, the complement of sea power, military force, is of altogether secondary force to a State so situated. . . . Naval resources unaided cannot, under the ordinary conditions which arise in warfare between maritime nations, inflict upon an enemy the amount of injury necessary to bring about collapse." 3. "The very fact of possessing overwhelming naval forces compels a nation to maintain military forces, if its naval forces are to have full scope for effective action when hostilities take place. . . . So far from preponderance at sea obviating the need for the upkeep of military force, it may increase that need in obedience to what is a strategical law." Colonel Callwell brings forward a mass of the best evidence in support of his contentions; the scope of his book is wide, and the importance of his subject is incontestable. The author is to be congratulated on the production of a work which none can read without profit.

PRINCIPAL ADDITIONS TO LIBRARY, FEBRUARY, 1906.

Notes on the Geology of the Continent of Africa. With an Introduction and Bibliography. Compiled in the Department of the General Staff, War Office, by ALEXANDER KNOX, B.A., Map Curator. Official. 8vo. 3s. (Presented.) (Harrison & Sons.)

Success among Nations. By Dr. EMIL REICH. 8vo. 10s. 6d. (Chapman & Hall, Ltd.) London, 1904.

Küstenschutz und Unternehmungen gegen denselben an der Schleswig-Holsteinisch-Jütischen Nord und Ostseeküste im Feldzug, 1864. By Cardinal von WIDDERN. 8vo. (Presented.) Berlin, 1906.

Voluntary versus Compulsory Service. By Captain F. N. MAUDE. 8vo. (Presented.) (Edward Stanford.) London, 1897.

A History of the Mess Plate of the 83th, the Connaught Rangers. By Captain H. F. N. JOURDAIN. 8vo. (Presented.) (Ballantyne Press.) Edinburgh, 1904.

The Outskirts of Empire in Asia. By the Earl of RONALDSHAY. 8vo. 21s. (William Blackwood & Sons.) Edinburgh, 1906.

The Journal of John Jourdain, 1608-1617, describing his Experiences in Arabia, India, and the Malay Archipelago. Hakluyt Society. Second Series. Vol. 16. Edited by WILLIAM FOSTER, B.A. Cambridge, 1905.

The Risen Sun. By Baron K. SUYEMATSU. 8vo. 12s. 6d. (Archibald Constable & Co., Ltd.) London, 1905.

Porfirio Diaz, Seven Times President of Mexico. By Mrs. ALEC TWEEDIE. 8vo. 21s. (Hurst & Blackett, Ltd.) London, 1906.

Les Campagnes de 1799—Jourdan en Allemagne et Brune en Hollande. By EDOUARD GACHOT. 8vo. (Presented.) (Perrin et Cie.) Paris, 1906.

The Regimental Records of the 1st Battalion Royal Dublin Fusiliers, formerly 102nd Royal Madras Fusiliers, 1st Madras Fusiliers, the Madras European Regiment, 1842-1904. 8vo. (Presented.) n.p., 1904.

The Salamanca Campaign. By Captain A. H. MARINDIN. Royal 4to. (Presented.) (Hugh Rees, Ltd.) London, 1906.

Catalogue of British, Hanoverian, and other Waterloo Medals in the collection of Henry Gaskell, with Notes on the Last Survivors by N. Kynaston Gaskell. By HENRY GASKELL. 8vo. 7s. 6d. (Oswald Fitch.) London, 1905.

Field Artillery Training, 1906. Official 12mo. 1s. (Presented.) (Harrison & Sons.) London, 1906.

List of the Officers of the Several Regiments and Corps of Fencible Cavalry and Infantry; of the Officers of the Militia; of the Corps and Troops of Gentlemen and Yeomanry; and of the Corps and Companies of Volunteer Infantry. 8vo. (Presented.) War Office, 1795.

Regulations for the Equipment of the Army. Part I. 8vo. 1s. (Presented.) (Harrison & Sons.) London, 1906.

Jane Austen's Sailor Brothers. By J. H. HUBBACK. 8vo. (Presented.) (John Lane.) London, 1905.

Sechs Monate beim Japanischen Feldheer. By Major BRONSART VON SCHELLENDORFF. 8vo. 7s. 6d. Berlin, 1906.

With the Cossacks. By F. MCCULLAGH. 8vo. 7s. 6d. (Eveleigh Nash.) London, 1906.

The Africander Land. By A. R. COLQUHOUN. 8vo. 16s. (John Murray.) London, 1906.

La Marine qu'il nous faut. By CHARLES BOS. Crown 8vo. 2s. 8d. (Berger-Levrault et Cie.) Paris, 1906.

Russian Projects against India. By H. SUTHERLAND EDWARDS. 8vo. (Remington & Co.) London, 1885.

Acts of the Privy Council, A.D. 1598-9. New Series. Vol. 29. 8vo. 10s. Edited by direction of the Lord President of the Council by J. R. DASNET, C.B. (Mackie & Co., Ltd.) London, 1905.

The British Army under Wellington, 1811-1813. By T. MILLER MAGUIRE. 8vo. 6s. (William Clowes & Sons, Ltd.) London, 1906.

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(10) YELLOW REGIMENT (2nd Battalion Co.).

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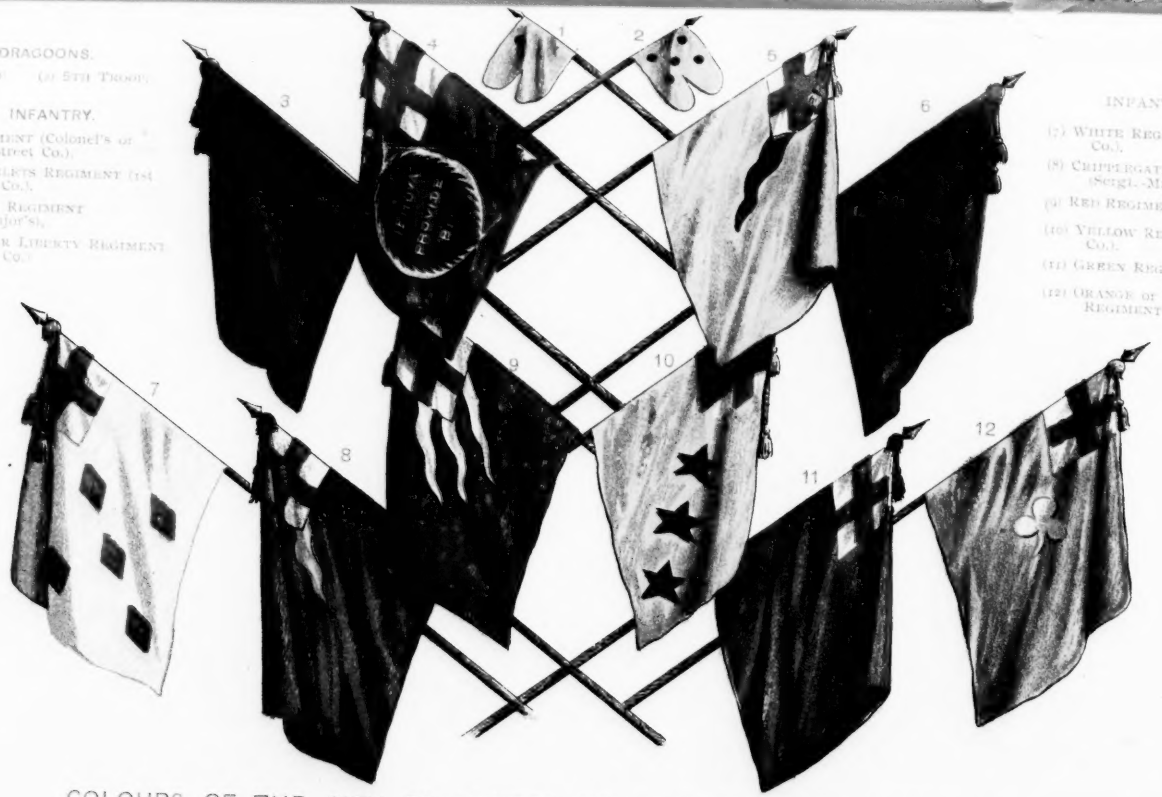

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